



SHORT COMMUNICATION

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Covid-19 Pandemic and Ophthalmic Effect on Strabismus and Pediatric Eye Disorders

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Abstract

An ongoing outbreak of pandemic caused by a novel coronavirus has severely infected humans worldwide. Even the characteristic symptom of COVID-19 is severe respiratory distress it also neurological involvement. In addition to its direct effect on human health, during the pandemic, several regular screening programs and periodic long term treatments were interrupted. Ophthalmic screening programs of children are essential for early diagnosis and correct treatment for the prevention of irreversible visual loss. In this article, potential symptoms of COVID-19 and ocular side effects on the pediatric population are discussed.

Key Words: COVID-19, pandemic, strabismus, pediatric eye, neurological involvement,

Introduction

The recent outbreak of novel coronavirus infectious disease 2019 (COVID-19) has spread quickly worldwide. The most characteristic symptom of this pandemic is severe respiratory distress. Additionally, several studies have already shown neurological involvement. (1-3)

Neurological involvement

Coronaviruses can be spread via a synapse-connected route and invade the central nervous system. Baig (2) et al. and Li (3) et al. demonstrate the higher incidence of central nervous system (CNS) invasion in a patient infected by a coronavirus. Increasing evidence base reports show that COVID-19 also presented with peripheral nervous systems (PNS) symptoms such as neuralgia, hyposmia, and hypogeusia. (1-3)

The coronavirus such as other viruses may have potential risk to invade cranial nerves, including second, third, fourth, and sixth cranial nerves. That may cause visual symptoms such as visual deterioration, diplopia, or nystagmus. But in some cases, these symptoms, such as palsies can be so delicate and may cause diplopia only in extreme ocular movement. Therefore ocular movements should be extensively evaluated to prevent misdiagnosis.

Ophthalmic Screening Programs for Children

In addition to its direct infected effect on humans worldwide during the pandemic, several regular diagnostic screening programs are postponed, and chronic long term treatments were interrupted in all aged groups.

Even the pediatric age group is less susceptible to COVID-19,

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and only a few numbers of cases have been reported until today; most of the children are indirectly affected by this pandemic. (4)

During the social isolation and quarantine period for COVID-19, almost all screening programs for identification of the risk factors and their threshold levels of most of the serious disorders are deferred. Some of them are regular ophthalmic screening programs of babies, toddlers, and children. These screening programs are regularly performed at either different health centers by a variety of health care personal such as primary family physicians, pediatricians for preschool age, or during the education period in different classes at schools. (5)

Parents may notice some important signs associated with serious ophthalmic pathologies such as leukocoria presented with white pupils, ptosis, or squint. In these cases, expert evaluation is essential for both differential diagnosis and time of treatment. Some of these conditions must treat without delays such as leukocoria that may be the sign of congenital cataracts or life treating intraocular tumors.

During the COVID-19 pandemic, some of these severe pathologies may not be detected, diagnosed, and treated on time.

Refractive errors, strabismus, and amblyopia are some of the preventable ocular disorders that can be treated in early childhood, only by re-evaluation in children to identifying before critical period.

Visual impairment is the fourth most common disability among children. Amblyopia is a preventable childhood vision disorder is the leading cause of visual disability that its prevalence ranges from 1% to 5% in the general population. (5,6) Amblyopia is one of the serious complications of congenital cataracts even after uneventful cataract extraction. Buch (6) et al. reported 29% of unilateral blindness in Copenhagen, and Dandona (7) et al. observed 8.3% of bilateral blindness in India following childhood cataract surgery.

Refractive errors, especially after congenital cataract surgery and strabismus, have been reported to be significantly associated with increased risk of amblyopia as a preventable permanent loss of vision.

The term of amblyopia, also referred to as "lazy eye," means the bluntness of vision, is derived from the Greek words "ambly," meaning; blunt and "ops" meaning; the eye. Undetected and untreated amblyopia seriously has the lifetime risk of severe visual disability due to increased risk of damage or loss of the fellow eye. The estimated risk to damage of a better-see-

ing fellow eye is reported to be between 1.2% and 3.3%. In addition, there is some limitation in the number of jobs and many different sports for individuals with reduced vision and lack of binocular vision such as stereopsis. (5-8)

Webber (9) et al. reported that the correction of refractive errors, treatment of amblyopia, and increased visual acuity cause the improvement of fine motor skills, in addition, to improve self-perception of physical competence. Wen et al. (5) reported that strabismus itself was strongly associated with quality of life in preschool-aged children. Therefore strabismus and amblyopia are not only health problems but also life-long social concerns.

The current guidelines recommended screening the population for identifying high-risk children and initiate the treatment before the critical period. Clear visual stimuli in early life are necessary to develop the correct organization of visual perception of the brain. On the other hand, abnormal visual input can disrupt normal processes of development in visual perception of childhood brain. Because in early childhood, both the visual portion of the brain and the visual perception system are still immature, and physiological connections between neurons are continuously progressing. The critical period means the time for normal development processes to become a normal adult brain. The critical period varies according to the type and the severity of amblyopia, such as few weeks in congenital cataracts and several years in strabismus. The treatment success is significantly related to the age at the diagnosis and timing of initiation of therapy. (6-10) There is no specific data if the coronavirus has any side effect on visual maturation in this critical period, as a neurotropic virus that spreads via a synapse-connected route in patients had sub-clinical COVID-19.

Screening programs for children are essential for detecting most of these ocular pathologies. During the COVID-19 pandemic, ophthalmic screening programs either performed by health care centers or at school are interrupted. Therefore in this period, some of the children with either refractive errors and/or amblyopia are not diagnosed, and the treatment could not be started.

Strabismus surgery may delay in a certain period in the COVID-19 pandemic, but if congenital cataract surgery postponed, it causes severe and treatment-resistant refractive amblyopia. After congenital cataract surgery, similarly prominent strabismus and significant ptosis, prompt treatment, and frequent re-evaluation are essential for the improvement of visual function.

In the patient with any type of amblyopia, close monitoring with regularly re-checking visual acuity is required until the children reach the age of visual maturity. Visual maturation is a dynamic condition so that patients under the amblyopia treatment such as occlusion or atropine penalization therapy should be regularly examined at intervals of one week per a-year of age. (5,8,10)

After the congenital cataract surgery, the weekly examination is recommended. During the COVID-19 pandemic, monitoring the amblyopia treatment and recommended regular frequently re-examination programs are not continued. That may cause serious visual disability in the future. (8-10)

As a conclusion, as far as we know, any ocular motility side effects of Coronavirus have not been reported yet. But it must bring in mind that as a neurotropic virus, it may have a potential invasion effect on cranial nerves, cause paralytic strabismus or interrupt to physiological connections between neurons in the visual maturation period. In addition, during the quarantine for the COVID-19 pandemic, screening programs for young age were suspended that it will increase the risk of vision problems in the future.

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