

Pediatric Ophthalmology: Amblyopia (Lazy Eye), Strabismus, and Pediatric Eye Examinations

Dr. Ali Wasef Alkhatib^{1*}¹Consultant Ophthalmologist, Primary Health Care Corporation, PHCC, QatarDOI: [10.36347/sajp.2023.v12i06.004](https://doi.org/10.36347/sajp.2023.v12i06.004)

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*Corresponding author: Dr. Ali Wasef Alkhatib

Consultant Ophthalmologist, Primary Health Care Corporation, PHCC, Qatar E-mail: alkhatib@phcc.gov.qa

Abstract

Review Article

The present study was conducted to review updates of the literature regarding clinical problems related to pediatric ophthalmology including amblyopia (lazy Eye), strabismus, and pediatric eye examinations. The field of pediatric ophthalmology is responsible for the discovery and treatment of vision abnormalities in children, both of which are extremely important obligations that fall under its purview. This subspecialty of pediatrics focuses on the treatment of ocular disorders in children. Both amblyopia and strabismus are prevalent disorders that, if left untreated, can have long-term negative repercussions on a person's vision. Amblyopia is more common than strabismus. The condition known as amblyopia is defined by a lack of eye movement, whereas strabismus is characterized by eyes that are turned inward. It is only via the delivery of routine eye examinations to juvenile patients that it is possible to detect these diseases as well as other abnormalities of the eye at an early stage. This not only paves the way for fast treatment but also provides the best visual outcomes that are achievable. Eye exams should be a priority for both parents and healthcare providers so that children can reach their full potential in terms of their visual development. This will allow children to attain their full potential as adults. Because of this, the child's eyes will be able to grow and develop to their full potential.

Keywords: Ophthalmology, pediatric, amblyopia, strabismus, pediatric eye examinations.

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INTRODUCTION

Pediatric ophthalmology is a specialization of the medical science known as ophthalmology. Its primary focus is on the diagnosis and treatment of eye conditions that are prevalent in children. Amblyopia, often known as "lazy eye," and, also known as "misalignment of the eyes," are two of the most common eye problems encountered in pediatric ophthalmology. It is imperative that children get routine eye exams. Amblyopia is one of the most common eye conditions seen in pediatric ophthalmology (Dong *et al.*, 2023).

According to the estimates that were published by the World Health Organization in 2006, there are around 1.4 million children who are blind out of a total of approximately 19 million children under the age of 15 who suffer from some form of visual impairment (VI) (Resnikoff *et al.*, 2004; WHO, 2020).

The majority of these children live in less developed countries in Asia and Africa, which together

account for two thirds of the global total. India alone is responsible for the accounting of about 200,000 of these items. Blindness is a disorder that lasts a lifetime; hence, even though there aren't very many blind children, the affliction will have a significant impact on their lives throughout their entire lives (Frick and Foster, 2003). Taking into account the average life expectancy of 70 years, (Riley, 2005), the estimated number of 'blind years' that will be experienced by these 200,000 children is second only to cataract in terms of the severity of the condition. As a result of this, juvenile blindness has important ramifications not just on an individual level but also on a societal and economic society (Kulkarni *et al.*, 2018).

According to the findings of numerous studies, vision is both the most essential sense for the process of learning and the major channel via which sensory information is taken in. In addition, the majority of a child's early learning is performed through the utilization of their sense of sight (Thompson and Merino, 2018). Because their sensory development is delayed, infants who are born with a visual impairment

experience considerable challenges in the areas of cognitive, physical development, and social interaction. This is because of the visual impairment's effect on their sensory development (Dulay and Murphy, 2002; Thompson and Merino, 2018). If they do not receive the most helpful rehabilitation during the early formative years of their lives, this can put them at risk for emotional issues, social isolation, and behavioral challenges (Murphy *et al.*, 2008; Anthony, 2014).

Despite the fact that the necessity of early intervention programs for visually impaired young children is widely acknowledged, there is a paucity of information regarding the effects these programs have in the real world for visually impaired young children (Sahin, 2017).

Amblyopia:

The loss of visual acuity in one or both eyes that is caused by incorrect binocular interaction during the critical phase of visual development and that cannot be connected to any ocular or visual system defect or to refractive error is the clinical definition of amblyopia (Guler and Alis, 2022). This loss of visual acuity can be caused by amblyopia in either eye. Amblyopia can affect people of any age, from infants as young as six months to individuals as old as 60 years (Noorden and Campos, 202). According to the American Academy of Ophthalmology, amblyopia is defined as an interocular difference of two lines or more in a visual acuity table (without naming any particular table), or a visual acuity that is worse than or equal to 20/30 with the best optical correction (Zhao *et al.*, 2010).

With a frequency that ranges from 3% to 6% in prosperous countries, amblyopia is the major cause of impaired visual acuity in both children and adults. This condition has a prevalence in these nations. Both the economy and society are significantly impacted by this situation in a meaningful way (Gunton, 2013). Amblyopic individuals typically have less employment opportunities open to them, and their overall quality of life tends to be of a poorer standard. This can present itself in a number of ways, including a person having less social contact, suffering from cosmetic agony (if combined with strabismus), having low self-esteem, experiencing visual disorientation, and being afraid of losing eyesight in the other eye (Wong, 2012; Webber, 2018).

The adoption of interocular difference of visual acuity as a definition takes into consideration many of the points that concern the various other definitions of amblyopia. These points include a reduction in visual acuity, a functional imbalance between the eyes, and inadequate binocular information input in primary visual cortex. In addition, the adoption of this definition acknowledges that amblyopia can be caused by a variety of factors. These are only a few

more examples among many others (Levi, 2012; Birch, 2013).

Amblyopia, often known as "lazy eye," is a neurodevelopmental disorder that can affect either one or both of a person's eyes and can manifest at any age (Thykjaer *et al.*, 2017). It is possible for a person to have amblyopia only in one eye. During a child's first few years of life, an abnormal development occurs in the visual pathways that travel from the eye to the brain. This condition is the result of this abnormal development (Reeves *et al.*, 2022). Amblyopia can be caused by a variety of eye conditions, the most frequent of which are refractive irregularities including nearsightedness, farsightedness, or astigmatism. Strabismus, in which one eye deviates from its natural alignment, is another common cause. Amblyopia may also result from the interaction of more than one of these risk factors (Elflein *et al.*, 2015; Ali *et al.*, 2023).

The effective treatment of amblyopia absolutely requires that the condition be identified in its early stages. It is recommended by the American Association for Pediatric Ophthalmology and Strabismus (AAPOS) that children receive a comprehensive eye exam from either an optometrist or an ophthalmologist prior to the age of 3 (Birch *et al.*, 2021). This exam should be performed at least once every year. This is in line with the suggestions that were provided by AAPOS (Holmes, 2020).

Amblyopia can be treated in a variety of methods, such as by patching the eye that is better able to see in order to compel the eye that is less capable to develop increased visual acuity, by wearing corrective glasses, or by participating in vision therapy. Amblyopia is a condition that affects the ability to see clearly. According to Stewart *et al.*, (2013), it has been shown that providing children with amblyopia with treatment that begins early and is maintained over time produces better visual outcomes. It has been established via research and investigation that this is the case.

There is abundant data suggesting that the initial treatment for amblyopia should involve correcting the patient's refractive error. This procedure improves the quality of the image that is seen on the retina by using corrective lenses to fix any refractive errors (Birch *et al.*, 2021). When only optical correction was utilized, amblyopia was healed in approximately one-third of previously untreated amblyopic newborns in less than thirty weeks (Pediatric Eye Disease Investigator Group, 2006, 2012). If an individual's condition does not improve after undergoing refractive surgery alone to treat their amblyopia, then they will require additional treatments for their problem. There are treatments that primarily target the impairment of monocular visual acuity, and there are also treatments that target the dysfunction and suppression of binocular

vision. Both of these types of treatments are available (Birch *et al.*, 2021).

Strabismus:

Strabismus, also referred to as squints or crossed eyes, is a condition that manifests itself when the eyes are not aligned in the correct position (Argiles *et al.*, 2023). It is possible to diagnose it as esotropia, which means a deviation inward (Osborne *et al.*, 2023), or exotropia, which means a deviation outward, and its symptoms may emerge intermittently or continually (Moradi *et al.*, 2023). Esotropia and exotropia both signify a deviation inward. If strabismus is not treated in a timely manner, it can result in amblyopia. This is due to the fact that the brain may choose to disregard information received from the eye that is misaligned in order to avoid experiencing double vision. If strabismus is treated, however, it is possible to avoid this outcome (Birch *et al.*, 2021).

In order to correctly identify strabismus, a patient's eyes need to be carefully examined. During this examination, the patient's visual acuity should be tested, the patient's eye motions and alignment should be evaluated, and the patient's ability to see with both eyes should be evaluated (Li *et al.*, 2015). The various treatment choices for strabismus will be determined not only by the severity of the condition but also by the underlying cause of the condition (Reeves *et al.*, 2022). Vision therapy, vision correction surgery, eye patches, and corrective eyewear are some of the options that may be available (Scheiman *et al.*, 2018). The research that was conducted in 2022 by Kulkarni *et al.*, found that early intervention is essential for preventing long-term visual impairment as well as the psychosocial implications that are linked with strabismus that has not been addressed (Kulkarni *et al.*, 2022).

Pediatric Eye Examinations:

The process of detecting and treating visual disorders that affect children includes performing routine pediatric eye examinations. This step is an extremely crucial component of the procedure (Chen *et al.*, 2023). The American Academy of Ophthalmology (AAO) recommends that children receive their initial complete eye checkup when they are roughly six months old (AAO, 2023). After this, additional evaluations are to be carried out on the child when they reach the age of three and before to their enrollment in school (Burton *et al.*, 2020; Wang *et al.*, 2022).

These examinations are performed in an effort to detect any eye abnormalities, including strabismus, amblyopia, and refractive problems, all of which have the potential to hinder the development of one's eyesight (Gupta *et al.*, 2019; Srivastava *et al.*, 2022).

During a pediatric eye exam, an expert in eye care will evaluate the child's visual acuity, eye alignment, eye motions, and the overall health of the

eyes. The examination may make use of highly specialized methods such as retinoscopy, which assesses a child's refractive error without the child's cooperation being required in any way in the process (Burton *et al.*, 2022). When eye problems are recognized in a timely way and allowed for, which allows for early intervention, early intervention can significantly improve a child's visual outcomes and overall quality of life (Kulkarni *et al.*, 2022). Early intervention can dramatically improve a child's visual results and general quality of life (Kulkarni *et al.*, 2022).

SUMMARY

The identification and treatment of visual defects in children are vitally significant responsibilities that fall under the ambit of pediatric ophthalmology. This field of medicine treats children with eye conditions. Both amblyopia and strabismus are common diseases that, if left untreated, can have long-term detrimental implications on a person's vision. Amblyopia is characterized by a lazy eye, whereas strabismus is characterized by crossed eyes. The early detection of these illnesses as well as other eye abnormalities, which lays the way for prompt treatment and ensures the best possible visual outcomes, is only feasible through the administration of routine eye examinations to juvenile patients. Eye exams should be a priority for both parents and healthcare providers in order for children to realize their maximum potential in terms of their visual development. This will allow for optimal growth and development of the child's eyes.

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