CASE REPORT

HIGH MYOPIA OF -26D IN A 3 YEAR OLD CHILD: A RARE CASE PRESENTATION

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ABSTRACT

High myopia in early childhood is rare and often associated with genetic, ocular, or systemic abnormalities. This case report describes a 3-year-old girl diagnosed with high axial myopia (-24.00 DS) and an axial length exceeding 33 mm, highlighting the importance of early detection and comprehensive management. A 3-year-old female presented with squinting and difficulty seeing distant objects. Cycloplegic refraction revealed -24.00 DS in both eyes, with no nystagmus or strabismus. Examination under anesthesia confirmed -26.00 DS on retinoscopy. Ocular examination was remarkable for severe chorioretinal atrophy and pale optic discs (0.5 CDR). Axial length measurements were 33.23 mm (right eye) and 33.15 mm (left eye). A diagnosis of high axial myopia was made, and myopia management was initiated with spectacle correction, soft contact lenses, and low-dose atropine therapy (0.01%). Systemic evaluation ruled out syndromic associations, and the patient was placed on close follow-up for progression monitoring and amblyopia management.

This case represents one of the highest reported myopic refractive errors in early childhood. It highlights the importance of early detection, individualized myopia management, and long-term monitoring to reduce the risk of progressive vision loss and complications. Advances in myopia control offer promising avenues for improving visual outcomes in highly myopic children.

Keywords: *High Axial Myopia, Early-onset Myopia, Pediatric Myopia, Refractive Error, Axial Length*

INTRODUCTION

Myopia is a common cause of decreased vision and uncorrected myopia is the leading cause of distance vision impairment globally. It is estimated to affect 2.6 billion people globally[1] and affects approximately one-third of children and adolescents globally, with considerable variation in prevalence rates across different demographic and ethnic groups, the highest rates reported for East Asian children (35.22%).[2] However, the prevalence of high myopia (> 6 diopters) is relatively low (0.03-0.2%) in children and can be linked to environmental factors such as prematurity and genetic factors.[3]

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Early onset high myopia can be isolated or syndromic (associated with ocular or systemic features). Systemic disorders such as Marfan syndrome, Stickler syndrome, Noonan syndrome, Weill-Marchesani syndrome, and homocystinuria, and Down syndrome and ocular disorders such as congenital glaucoma and retinopathy of prematurity are associated with secondary myopia.[3] The impact on visual development can be profound, as uncorrected myopia in this critical period may lead to amblyopia, strabismus, anisometropia, retinal abnormalities or impaired binocular vision.[4] Unlike physiologic myopia, pathologic or high myopia in children is persistent and progressive necessitating early diagnosis, complete ophthalmological and systemic examination and timely intervention as delayed correction of significant refractive errors in early childhood can result in long-term visual deficits. High myopia in children is not well documented in the literature. In a population survey of 728 children ages 6 to 7 years old, the most myopic cycloplegic refraction

was −5.0 D, with no children identified with high myopia.[5] There is a paucity of data in literature on highest myopia in early childhood. To the best of our knowledge, there are no reported cases of high myopia in childhood in Pakistani population. This case report presents a unique instance of early childhood high myopia, emphasizing the importance of early detection, comprehensive evaluation, and appropriate management to prevent long-term visual impairment.

Case presentation

A 3-year-old girl presented to our clinic with complain of decreased vision for far. Her mother reported that she squints her eyes when watching TV and brings objects very close to eyes to see clearly.

She was born at 38weeks gestation with no complications. There was no developmental delay and she could talk and walk appropriate for her age. Her medical and ocular history were both unremarkable. Both her mother and father are moderate myopes with no other remarkable ocular history.

Ophthalmologic examination recorded a visual acuity of 6 cpcm. Cycloplegic refraction done after instilling 1% cyclopen revealed a refractive error of -24DS in both eyes. There was no nystagmus or strabismus. An ocular examination under anesthesia was conducted that recorded a refractive error of -26DS on retinoscopy. Her anterior segment assessment was unremarkable for both eyes however dilated fundus exam revealed generalized severe chorioretinal atrophy and pale discs of 0.5 CDR with peripapillary atrophy. K readings were 42.75 and 43.5, 42.5 and 43.0 in right and left eyes respectively.

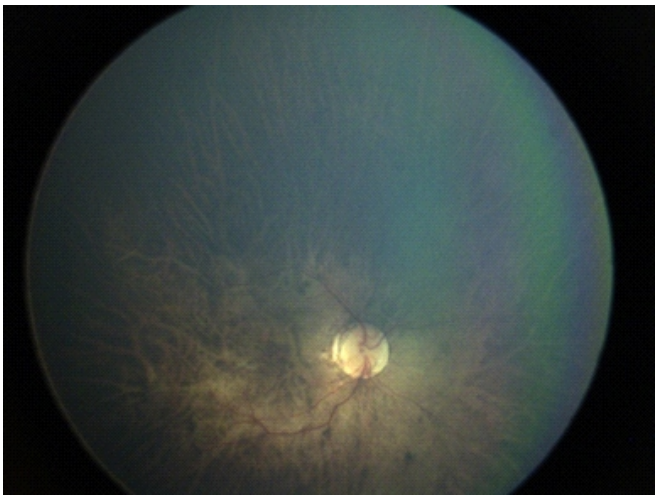

Figure 1: Fundus photograph of right eye

Note: Generalized severe chorioretinal atrophy and disc palor are visible.

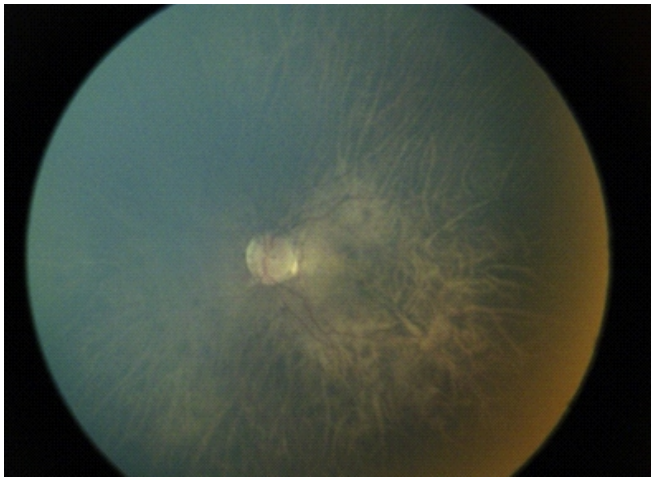

Figure 2: Fundus photograph of left eye

Note: Generalized severe chorioretinal atrophy and slightly pale disc with peripapillary atrophy are visible.

Corneal diameters were 11 mm vertical and 12 mm horizontal in both eyes. IOP was measured by Perkins as 18 mmHg in both eyes. Axial length was 33.23mm in right eye and 33.15 mm in left eye, recorded on A-scan.

A diagnosis of high axial myopia was made and myopia management including soft contact lenses, spectacle correction and low dose atropine was offered to the patient. She was referred to a paediatrician for systemic examination for associated syndromes but that was found to be unremarkable. She is kept on close follow-up to monitor for progression and treatment of amblyopia.

DISCUSSION

The prevalence of myopia is increasing by each passing year and it is now considered an urban epidemic. Projections suggest that by 2050, nearly 50% of the world's population will be myopic, with a substantial proportion experiencing high myopia.[6] High myopia in early childhood is more commonly secondary while in older children it is rapidly progressive axial myopia, hence high myopia in early ages necessitates intensive investigation to rule out underlying genetic, ocular or systemic causes. Myopia of prematurity (MOP) is present in 19% of eyes with any degree of ROP (Retinopathy of Prematurity) and only 6% in eyes without ROP.[7] It has specific biometric features that differ from typical myopia, specifically steeper corneas, shallower anterior chambers, thicker lenses, and shorter axial lengths than full-term infants.[8] High myopia can be polygenic with influence of environmental factors like near work, or monogenic. Monogenic forms of myopia are categorized into four groups: ametropic retinal dystrophies; connective tissue disorders; monogenic

isolated high myopia; and other disorders.[3] The case of a 3-year-old girl with a refractive error of -26.00 diopters (D) and axial lengths exceeding 33 mm underscores the critical need for early detection and comprehensive management strategies. The presence of nystagmus alongside high myopia may indicate an underlying retinal dystrophy. A thorough clinical evaluation can help identify associated conditions. Examining the cornea, iris, anterior chamber, and lens can reveal keratoconus, transillumination defects (suggestive of albinism), anterior lens dislocation, microspherophakia, or lenticonus. Vitreous abnormalities, such as the membranous or beaded appearance seen in Stickler syndrome, can also aid diagnosis. Retinal examination is crucial for detecting inherited retinal diseases or signs of neonatal interventions for retinopathy of prematurity (ROP) that may not be evident from patient history. In older children with high myopia, optic nerve changes, myopic maculopathy, and posterior staphyloma may be observed, which can have long-term implications for visual health. Early and effective management is crucial to slow the progression of myopia and mitigate associated risks. Traditional single-vision lenses correct refractive errors but do not control myopia progression. However, specialized lenses like the MiYOSMART lens, which incorporates Defocus Incorporated Multiple Segments (DIMS) technology, have shown a 60% reduction in myopia progression in children aged 8 to 13 years.[9] Orthokeratology (Ortho-K) lenses temporarily reshape the cornea to reduce refractive errors and have been associated with a 50% reduction in myopia progression.[10] Additionally, bifocal and multifocal soft contact lenses have shown promise in slowing myopia progression. Low-concentration atropine (0.01%) has been effective in slowing myopia progression with minimal side effects.[11] The exact mechanism remains unclear, but it is hypothesized to involve modulation of biochemical pathways influencing eye growth. Studies have demonstrated that increased time spent outdoors is associated with a reduced incidence of myopia. Exposure to natural light and engagement in distance-viewing activities are believed to play protective roles. Limiting continuous near tasks and encouraging regular breaks can help mitigate myopia progression.[12] Regular follow-up is essential to monitor axial length, refractive status, and ocular health. Early intervention and adherence to management strategies can significantly reduce the risk of sight-threatening complications. However, high axial myopia diagnosed at such a young age requires vigilant monitoring due to the potential for rapid progression.

CONCLUSION

In conclusion, this case is the highest recorded high myopia in a child. It underscores the importance of early detection and a multifaceted approach to managing high axial myopia in young children. Combining optical, pharmacological, and lifestyle interventions offers the best chance to slow myopia progression and preserve visual function. Ongoing research and advancements in myopia control strategies hold promise for more effective management in the future.

CONFLICT OF INTEREST

None.

SOURCE OF FUNDING

None.

ETHICAL CONSIDERATIONS

This study was conducted according to the guidelines of ethical committee of Al-Shifa Trust Eye Hospital, Rawalpindi. Informed consent was obtained from the parents of the patient before enrollment in the study. Confidentiality and patient anonymity were strictly maintained throughout the research process.

Authors' Contributions:

Shafaq Najmi: Conception of study/Designing/Planning

Ambreen Yousaf: Experimentation/Study Conduction, Manuscript Writing

Nusrat Sharif: Analysis/Interpretation/Discussion

Aunaiza Maqbool: Critical Review

Fauzia Naureen: Facilitated for Reagents/Material Analysis

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