

**Case Report**
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## CCTV as an Effective Low Vision Aid in a Child with Bilateral Microcornea: A Case Report

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### ABSTRACT

**Background:** Microcornea is a rare congenital anomaly characterised by a corneal diameter of less than 10 mm, often associated with high hyperopia and significantly reduced visual acuity. Low vision rehabilitation in paediatric patients with such structural anomalies presents unique challenges.

**Case Presentation:** We report the case of a 10-year-old child with bilateral microcornea presenting with Best-Corrected Visual Acuity (BCVA) of 6/60 in both eyes despite full spectacle correction of +11.00 DS. Colour vision and visual fields were within normal limits. The child experienced significant difficulty in near-vision tasks, particularly reading standard-print books. A Closed-Circuit Television (CCTV) magnifier was trialled as a low vision device.

**Outcome:** With the aid of CCTV magnification, the patient was able to read printed material independently, demonstrating marked improvement in functional near vision.

**Conclusion:** CCTV magnifiers are an effective and practical low vision intervention in paediatric patients with high hyperopia secondary to microcornea. Early rehabilitation with assistive technology is essential for educational inclusion and quality of life.

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### Introduction

Microcornea is a rare congenital anomaly defined by a horizontal corneal diameter of less than 10 mm (normal: 11–12 mm in adults), occurring either as an isolated finding or in association with other anterior segment dysgeneses such as microphthalmos, coloboma, and anterior chamber anomalies [1,2]. The condition is frequently accompanied by high hyperopia due to the shortened axial length and reduced corneal curvature, which significantly compromises visual acuity even after optical correction.

Visual impairment in children has far-reaching consequences on cognitive development, educational achievement, and social participation. According to the World Health Organization (WHO), a person is classified as having low vision when their Best-Corrected Visual Acuity (BCVA) is less than 6/18 but equal to or better than 3/60 in the better eye [3]. Rehabilitation of such individuals, particularly children, demands a multidisciplinary and individualised approach combining optical and non-optical aids, environmental modifications, and task-specific training.

Closed-Circuit Television (CCTV) magnifiers, also known as video magnifiers, are electronic devices that use a camera to

capture and display magnified images of text and objects on a monitor. They offer variable magnification, adjustable contrast, and the flexibility to accommodate a wide range of print sizes and viewing distances, making them particularly advantageous in cases where optical magnifiers provide insufficient magnification or are ergonomically unsuitable [4,5].

We report a case of a 10-year-old child with bilateral microcornea and high hyperopia who achieved functional near vision for reading with the aid of a CCTV magnifier, highlighting the importance of electronic magnification devices in the paediatric low vision population.

### Case Presentation

#### Patient History

A 10-year-old male child was referred to the Low Vision Clinic at Rotary Eye Institute, Navsari, with a chief complaint of inability to read standard print and significant difficulty in near-vision tasks. The child's parents reported that he had been struggling academically due to his inability to read textbooks at a normal working distance. He had been using spectacles for several years without significant improvement in near reading ability. There was no relevant family history of ocular disease. The birth history was unremarkable, and the child was developmentally normal for his age.

## Clinical Examination Findings

**Table 1: Summary of Clinical Examination Findings**

Parameter	Finding
Age / Sex	10 years / Male
Chief Complaint	Difficulty reading; near-vision tasks at very close distance
Diagnosis	Bilateral Microcornea
Corneal Diameter (RE)	< 10 mm (microcornea)
Corneal Diameter (LE)	< 10 mm (microcornea)
Spectacle Correction (RE)	+11.00 DS
Spectacle Correction (LE)	+11.00 DS
BCVA — Right Eye (Distance)	6/60
BCVA — Left Eye (Distance)	6/60
Near Vision (unaided)	Unable to read N-print at any distance
Colour Vision	Normal (Ishihara 38 plates — all correct)
Visual Field	Full to confrontation; no scotoma detected
Anterior Segment	Bilateral microcornea; anterior chamber shallow
Posterior Segment	Normal disc, macula, and periphery bilaterally
IOP	Within normal limits bilaterally

### Low Vision Assessment

Low vision assessment was conducted using standardised protocols. Distance visual acuity was measured using the LogMAR chart. Near visual acuity was assessed using the Reduced Snellen chart and the N-print notation. The patient was unable to read N48 print at any working distance with his habitual spectacle correction. A detailed functional history was taken, establishing that the primary goal was to enable independent reading of standard school textbooks.

Contrast sensitivity was found to be reduced under photopic conditions, consistent with the degree of visual impairment. Given the patient's age, binocular vision status, and the high degree of hyperopia limiting optical magnification options, electronic magnification was considered the most appropriate intervention.

### Low Vision Device Trial-CCTV Magnifier

A desktop CCTV video magnifier (colour, with adjustable magnification range of 2x to 72x) was trialled in the clinic. The patient was seated comfortably in front of the device, and the working distance was adjusted to achieve maximum comfort. The magnification was set initially at 10x and gradually adjusted based on the patient's response.

At a magnification of approximately 16x–20x with a positive contrast setting (black text on white background), the patient was able to fluently read N8 print — a level sufficient for standard school textbook reading. The reading speed was observed to improve progressively during the trial session as the child familiarised himself with the device.

Key features of the CCTV magnifier that contributed to success included: variable magnification suitable for both text reading and examination of illustrations and diagrams; high-contrast display mode to compensate for reduced contrast sensitivity; and a large

display monitor that eliminated the need for the patient to maintain an uncomfortably close working distance to reading material.

### Discussion

This case illustrates the challenges of visual rehabilitation in a child with bilateral microcornea and high hyperopia, where conventional optical magnifiers alone are inadequate. Microcornea in association with high hyperopia represents a unique clinical scenario: despite an intact posterior segment and preserved colour vision and visual fields, central visual acuity remains severely limited due to optical aberrations inherent to the small, steep cornea and the resultant ametropia [1-6].

The use of conventional optical near-vision aids such as hand magnifiers and stand magnifiers in children with high hyperopia is limited. The required add power for near magnification becomes excessively high, resulting in small field of view, restricted working distance, and significant patient fatigue all of which are poorly tolerated by children [7]. Electronic magnifiers like CCTVs overcome these limitations by providing high magnification across a large field of view, maintaining a comfortable working distance, and offering enhanced contrast.

Paediatric low vision rehabilitation requires consideration of the specific educational and developmental needs of the child. School-aged children require the ability to read printed material, view blackboards, and use computers. The CCTV device was found to be effective for the near-vision reading task, which was the primary concern in this patient's educational setting. Training in device use, combined with teacher awareness and school accommodation strategies, are essential components of a complete rehabilitation plan [8].

From a neuroplasticity perspective, early visual rehabilitation in children is critical. The visual cortex continues to develop until approximately 8–10 years of age, and ensuring adequate visual stimulation through assistive devices may support ongoing visual development and prevent or limit amblyopic suppression [9]. While BCVA remained 6/60 in this patient, the improvement in functional vision and reading ability represents a meaningful clinical outcome.

Previous studies have demonstrated the efficacy of CCTV devices in adult low vision populations; however, paediatric case reports of CCTV use in structural corneal anomalies such as microcornea remain sparse in the literature. This case adds to the growing evidence base supporting electronic magnification in paediatric low vision rehabilitation [4,5,10].

### Conclusion

This case report demonstrates that CCTV magnifiers can provide effective functional near-vision rehabilitation in paediatric patients with bilateral microcornea and high hyperopia, where best-corrected visual acuity is limited to 6/60. Despite the absence of improvement in measured visual acuity, the child achieved independent reading ability with CCTV magnification, which is a meaningful and educationally significant outcome.

Low vision practitioners should consider electronic magnification devices as a first-line intervention in children with high hyperopia and corneal anomalies, particularly when optical magnifiers are impractical. Early referral to low vision clinics, comprehensive functional assessment, and appropriate device training are essential to maximise the educational potential and quality of life of visually impaired children.

### Patient Consent

Written informed consent was obtained from the patient's parents/guardians for the publication of this case report and any accompanying clinical details. No identifying information has been included in this report.

### Conflict of Interest

The author declares no conflict of interest.

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