Hybrid Multifocal Contact Lens Design for Myopia Management is Astigmatic Children

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BACKGROUND

High myopia increases the risk of irreversible vision loss and is correlated with comorbidities such as glaucoma, macular degeneration, retinal detachments, and premature cataracts. Children who are myopic are the most at risk since there is more time for progression to higher myopia. Thus, early intervention is crucial for preventing high myopia and its associated visual impairments.

Myopia management (MM) with contact lenses is accomplished by creating myopic peripheral defocus which is assumed to act as a retinal cue in order to slow myopic eye growth. Gas permeable (GP) lenses offer good optical correction for astigmatism; additionally, multifocal optics can be easily placed on the front surface for MM. The following presents a case series of 3 pediatric patients who were fitted into center distance bifocal hybrid lenses (SynergEyes, Carlsbad, CA) for MM.

PATIENT # 1

Chief Complaint & History of Present Illness

A 14-year-old Caucasian male gymnast with high myopia and astigmatism that progressed 2.00 diopters in the previous 2 years. He was wearing soft toric lenses for distance correction.

Manifest Refraction, Axial Length, and Visual Acuity

OD: - 6.25-0.75x170 25.24 mm 20/20
OS: - 6.25-1.25x030 25.32 mm 20/20

Corneal Topography

OD: 43.88/45.34@091
OS: 44.21/45.30@098

Lens Design for Myopia Management

OD: 7.60/-6.50 / 14.50 8.10 Skirt
Distance Zone 4.00 mm ADD +2.50 VA 20/20
OS: 7.50/-6.75 / 14.50 8.10 Skirt
Distance Zone 4.00 mm ADD +2.50 VA 20/20

PATIENT # 2

Chief Complaint & History of Present Illness

A 13-year-old Asian female ice skater with myopia and astigmatism that progressed 1.00 diopters in the past 1 year. She was wearing soft toric lenses for distance correction.

Manifest Refraction, Axial Length, and Visual Acuity

OD: - 1.75-4.50x178 22.90 mm 20/20
OS: - 2.50-2.50x011 22.57 mm 20/20

Corneal Topography

OD: 42.34/46.75@086
OS: 43.66/46.60@092

Lens Design for Myopia Management

OD: 7.70/-0.25 / 14.50 8.40 Skirt
Distance Zone 4.00 mm ADD +2.50 VA 20/20
OS: 7.60/-0.25 / 14.50 8.40 Skirt
Distance Zone 4.00 mm ADD +2.50 VA 20/20

PATIENT # 3

Chief Complaint & History of Present Illness

A 8-year-old Caucasian female basketball player with myopia and astigmatism. She was new to contact lens wear and had progressed 0.75 D in the the past year.

Manifest Refraction, Axial Length, and Visual Acuity

OD: - 1.25-0.50x008 25.24 mm 20/20
OS: - 1.00-2.75x161 25.32 mm 20/20

Corneal Topography

OD: 43.50/44.87@097
OS: 43.37/47.12@077

Lens Design for Myopia Management

OD: 7.80/-1.25 / 14.50 8.40 Skirt
Distance Zone 4.00 mm ADD +2.50 VA 20/20
OS: 7.80/-0.75 / 14.50 8.40 Skirt
Distance Zone 4.00 mm ADD +2.50 VA 20/20

RESULTS AND DISCUSSION

At the 2 and 6 weeks progress evaluation, all patients reported good vision and has no issues with the lenses while participating there athletic activities. At 6 month follow-up, no progression in myopic refraction or axial eye length was noted in either eye for all patient.

Typical orthokeratology treatments do not aim to correct for high myopia and astigmatism. Similar to orthodox orthokeratology, bifocal contact lens optics slow the progression of myopia. A study revealed that during a 2-year treatment period, bifocal contact lens wear resulted in a reduction of 50% in the progression of myopia and 29% reduction in axial elongation compared to single vision contact lenses.

For patients with high myopia and astigmatism center distance hybrid lenses (Figure 1) offer good comfort and more stable optics in comparison to soft toric lenses. Adding a front surface center distance bifocal to hybrid lenses is an option for myopia management in children with myopia astigmatism.

Figure 1. (Right) Center distance multifocal for myopia management.

CONCLUSION

Myopia is increasing worldwide; however, with early intervention, high myopia can be prevented. Myopia control through contact lenses aims to create myopic defocus in order slow eye growth. Center distance hybrid bifocal contact lenses are a good choice for contact lens myopia management in children with high astigmatism and myopia.

SELECTED REFERENCES

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Walline JJ. Myopia Control. Eye & Contact Lens. 2016;42:3-8.
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