

CAS Diagnostica FHNW

Pediatric Case Report #2

Myopia Management with Ortho-Keratology

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History and Symptomes

A 10 year old Caucasian girl (#1246) first visitited our clinic to get her eyes checked for new glasses. Her last glasses were prescribed in Juli 2018 by her Ophthalmologist and an annual examination was determined, yet her ophthalmologist never called her up in the past two years.

Therefore her mother decided to come to our clinic after 27 months. The patient only complained about her distance vision when she covered her left eye while wearing her glasses.

Refractive History

First Glasses with age of 7 yrs:

OD: -2.00 -0.25 80° VA: n/a

OS: -2.00 -0.25 80° VA: n/a

Her second and current pair of glasses with age of 8 yrs. 14 month later

OD: -3.50 – 0.25 80° VA: 1.20 VD: 16mm

OS: -3.00 -0.25 80° VA: 1.20 VD: 16mm

Her visual acuity with the current spectacles was OD 0.2 and OS 0.8+.

No ocular history beside her glasses was reported. Her medical history was positiv in regards of rare recurrent herpes infection on facial skin, other than that it was negative and no medication is used. She has a positive family history of her mother being moderately myope around -8.00 diopters.

Differential Diagnosis

- Progressive Myopia
- Keratoconus
- Amblyopia

Eye Exam

Objective refraction using dry retinoscopy:

OD: -5.25 -0.50 70°

OS: -2.75 -0.50 85°

Autorefractometer Nidek Tonoref II

-5.75 -0.25 44°

-3.50 -0.50 70°

Subjective refraction

A monocular subjective refraction was obtained based on the dry retinoscopy results. A trial lens frame was used and the contralateral eye was “covered” with +1.50 D to reduce the accommodative response in refraction to its minimum. Under binocular condition the results were obtained using the Humphrey’s Method with +0.75 on the contralateral eye.

OD: -5.50 -0.50 64° VA 1.20 VD 12mm

OS: -3.00 -0.50 72° VA 1.20 VD 12mm

Motility testing showed no extraocular muscle restriction in any direction, both pupils were round and equal in size and reacted prompt to direct and indirect illumination. No RAPD was noted.

NPC: Break 5cm, recovery 8cm, within normal limits

Cover-Test: @ far no strabismus or heterophoria was found

@ 40cm a mild exophoria was found, within normal limits

Airpuff-NCT: 13.3mmHg / 14.3mmHg @ 9am

Anterior Segment

OU: lid and lashes normal, conjunctiva within normal limits, cornea clear, no signs of Vogt Stria or Ring of Fleischer, no fluorescein positive staining, limbal vasculature within normal limits, deep anterior chamber van Herrick 2:1 nasal and temporal, anterior chamber no flare, no cells, crystalline lens is clear, no floaters in the anterior vitreous.

For the topography measurement the Oculus M5 topographer was used (Figures 1 & 2). A mild regular corneal astigmatism was found and K-Values within normal limits, no abnormal steepening or sign of ectasia of the cornea was found in the Zernike-Analysis (Figure 3 & 4).

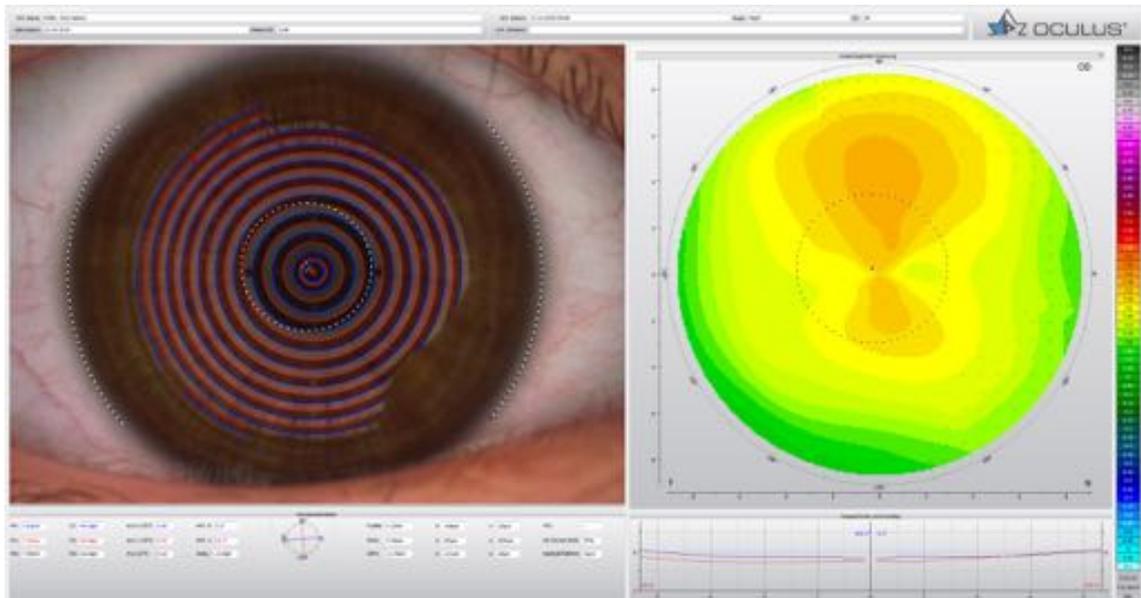


Fig. 1: *Oculus Topography of the right eye*

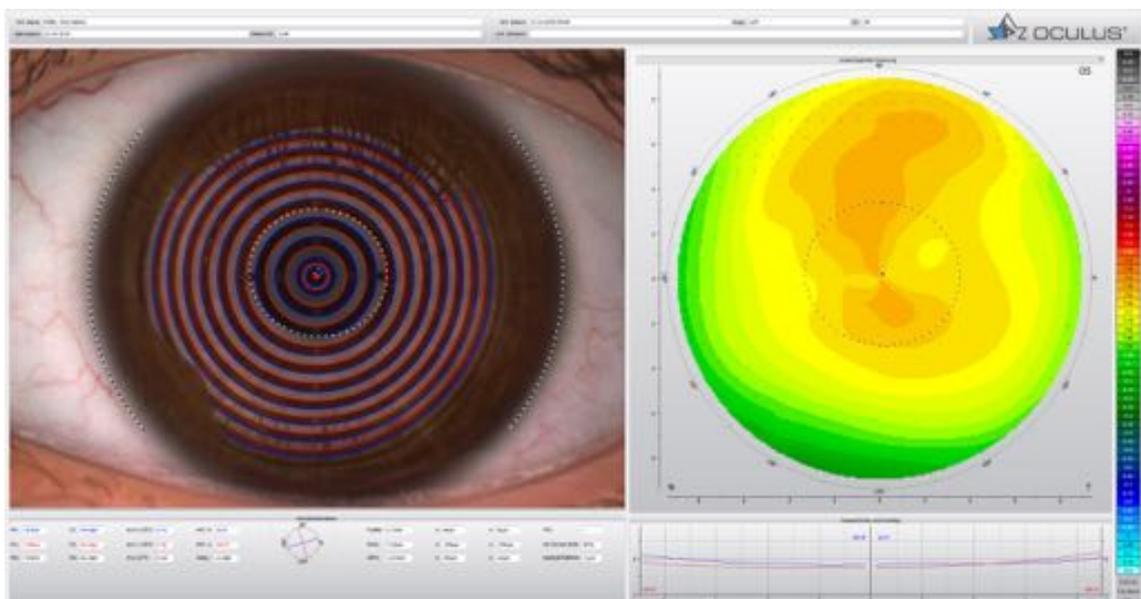


Fig. 2: *Oculus Topography of the left eye*

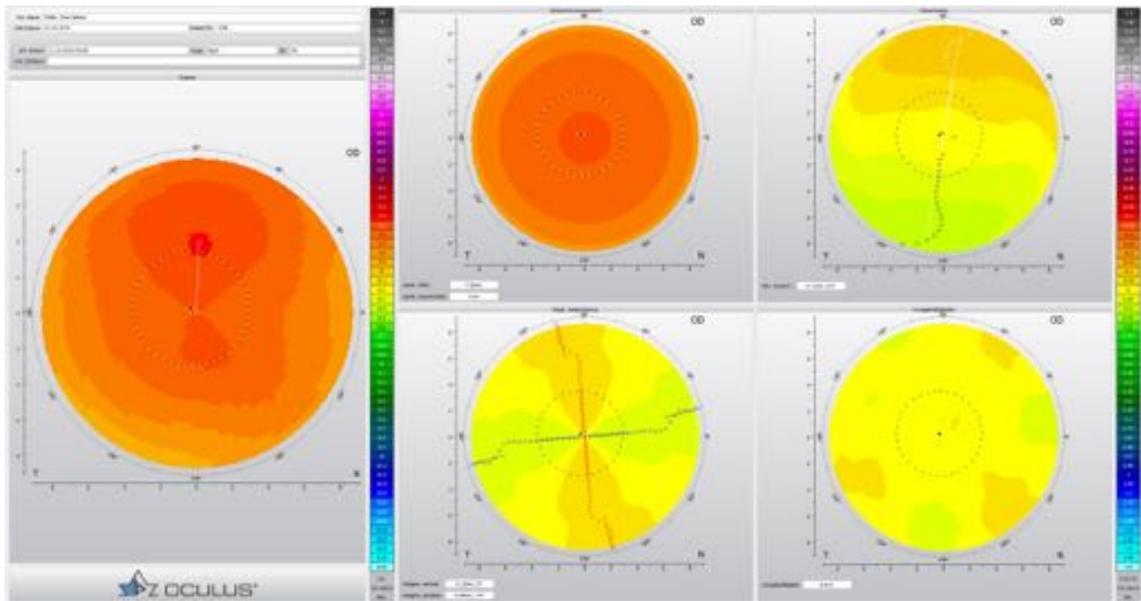


Fig. 3: *Oculus Zernike-Analysis of the right eye*

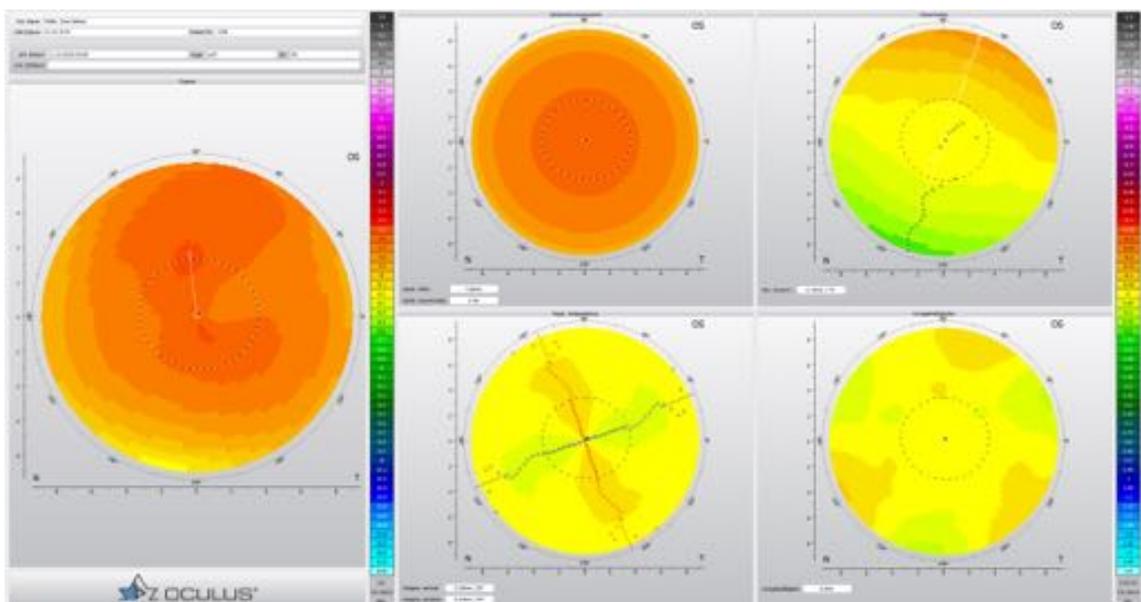


Fig. 4: *Oculus Zernike-Analysis of the left eye*

OCT-Pachymetry (Figure 5 & 6) showed OU a slight thinner cornea than average (OD 511 μ m; OS 509 μ m), yet no decentered apex (Location y), no thinning of the epithelium over the apex, therefore no sign of Keratoconus was found.

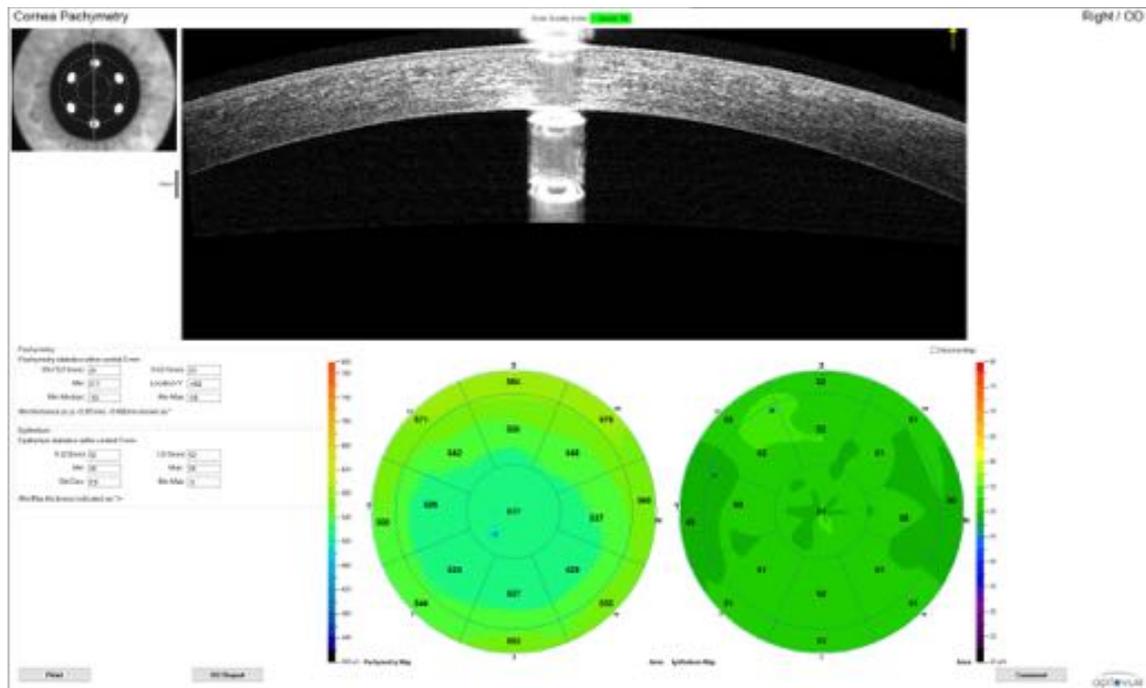


Fig. 5: Optovue Pachymetry and Epithelium-Thickness-Map of the right eye

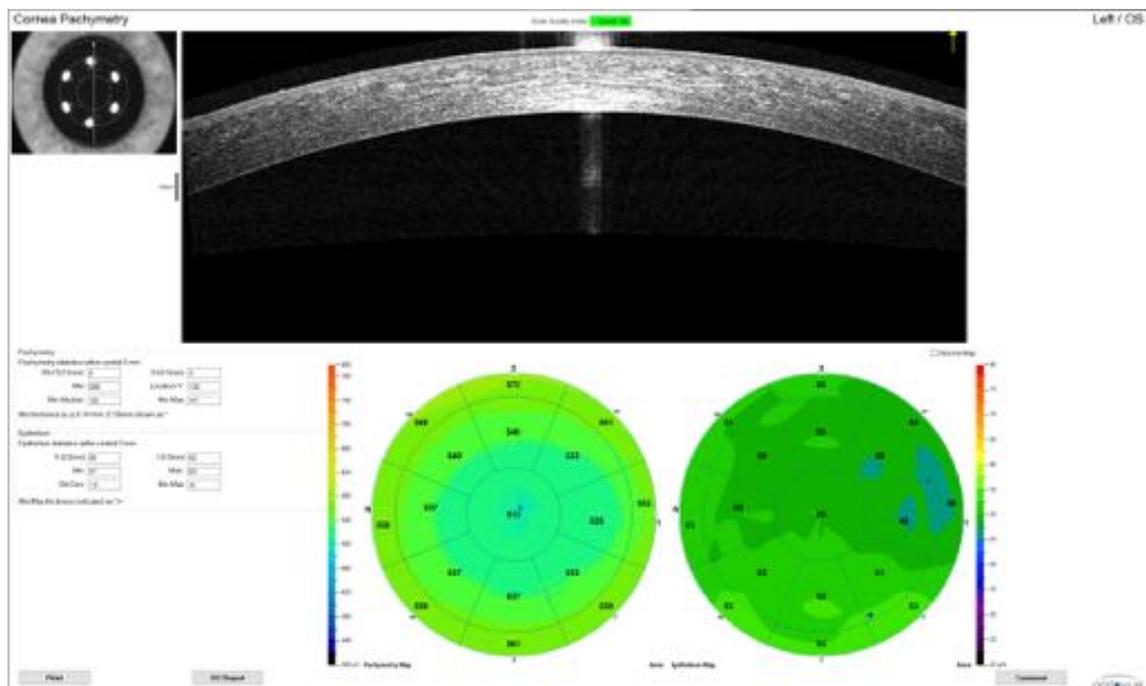


Fig. 6: Optovue Pachymetry and Epithelium-Thickness-Map of the left eye

Posterior Segment

On Fundus-photography on both eye a normal macular pigmentation and foveal reflex was found yet the foveal contour in fundus photography flash reflex seems to show a more depressed contour on the right eye compared to the left eye . The nerve fibers and temporal vascular branches showed a temporal shift of the angle kappa.

A small disc with circumferential peripapillar atrophy was found on the right eye. The left eye presented with a larger disc and less peripapillar atrophy.

A C/D ratio (H/V) of 0.1 / 0.1 in the right eye and in the left eye 0.3/ 0.25 in 90D was found.

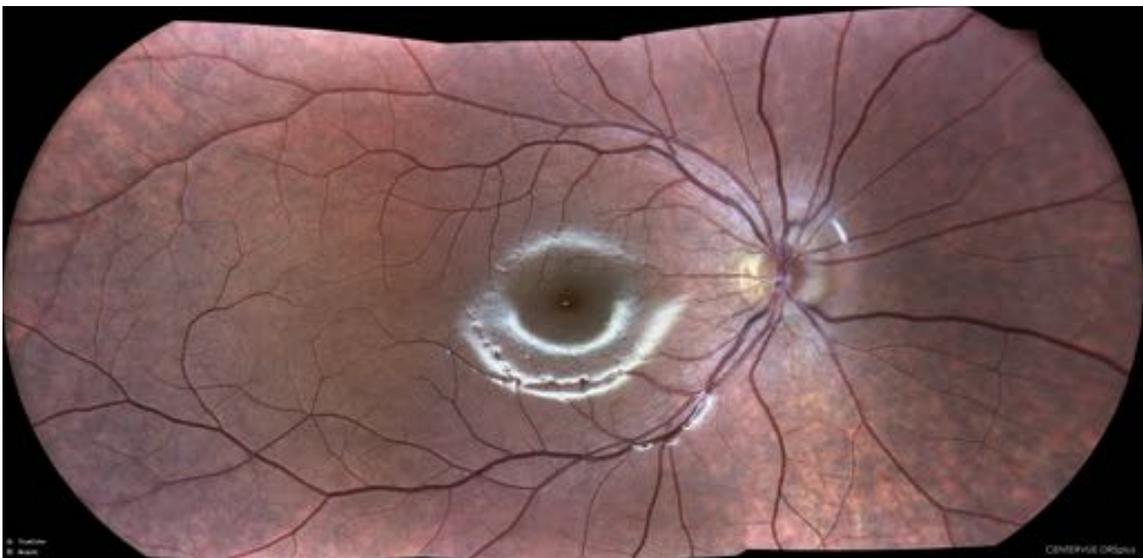


Fig. 7: True color panorama fundus photography with DRS plus of the right eye

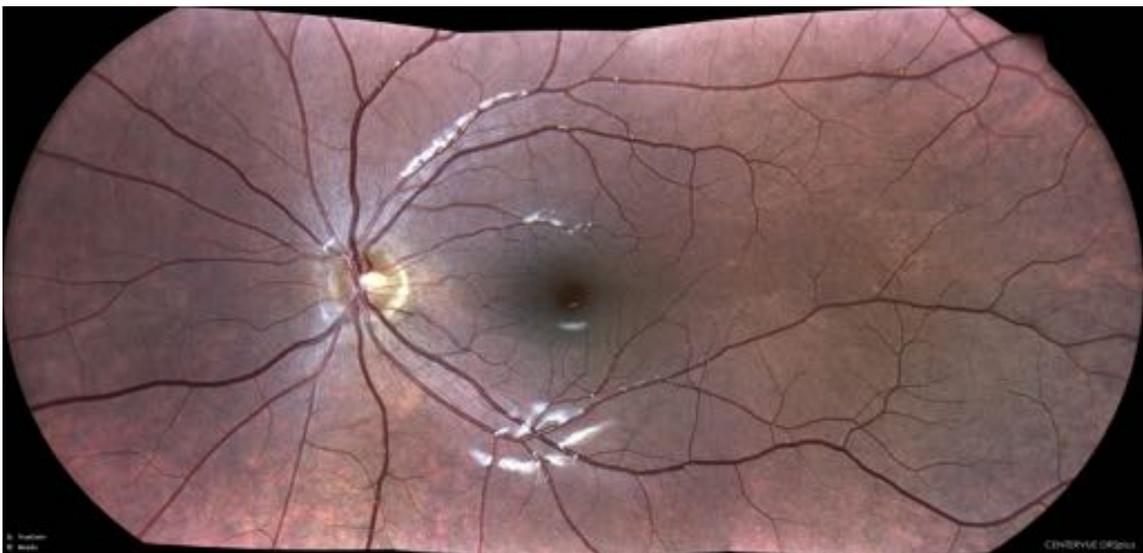


Fig. 8: True color panorama fundus photography with DRS plus of the left eye

Diagnosis and plan

Based on her refractive state in respect of her age, her positive refractive and family history for myopia, the dry retinoscopy results, visual acuity, normal cover testing and the appearance of the peripapillar area a progressive myopia was strongly assumed.

The patient' parents were informed that her vision on her right eye could be fully recovered. Nevertheless a high risk of further progression of her myopia was explained and this would lead to an increasing risk of developing long-term sight threatening consequences.

The option of ortho-keratology lenses and low dose Atropin therapy were explained and advised to start with either or a combination of both after a cycloplegic exam. Also behavioral changes were discussed with the parent to read in good light, keep reading distance at least in 35 to 40 cm, follow the 20's-rule, to pause reading every 20 minutes for 20 second and gaze at 20 feet (6m), encourage the daughter to spend time with outdoor-activities during the daylight.

Since the parents wanted to start as soon as possible with ortho-keratology myopia-progression treatment, a prescription for new spectacles wasn't handed out.

To rule out any myopia related to accommodative disturbances or pseudo myopia the patient was referred to her ophthalmologist for a cycloplegic refraction. In addition to the refraction an axial length measurement was requested to compare with normal values and to ensure the reduction of myopia progression and axial elongation over the course of time with myopia treatment. The referral letter also suggested to look into and discuss the possibility of a treatment combination with ortho keratology and low dose atropine.

Additional results from ophthalmologic exam:

Retinoscopy in cycloplegia: OD: -5.75 -0.25 20° OS: -3.25 -0.25 60°

Prescription in cycloplegia: OD: -5.75 -0.25 20° OS: -3.25 -0.25 60°

Axial length: OD: 25.34mm OS: 24.57mm

Stereovision (TNO): until 60"

Discussion

Based on the refractive history and her current refraction in respect of her age^{1,2}, her positive family history with one of her parents being moderate myopic^{2,3}, her close reading posture for long hours, and the peripapillar and retinal findings⁴ a risk for progression of myopia with axial elongation is very high and strongly suggests a treatment of the myopia progression.

Keratoconus could be ruled out based on regular topography, regular corneal astigmatism, normal corneal power^{5,6} and normal pachymetry mapping⁷ and no decreases visual acuity on either eye was found.

Also Amblyopia could be ruled out due to full recovery of her visual acuity in subjective refraction and her normal binocular visual status.

After the exam at the ophthalmologist also any myopia related with accommodative disorders could be ruled out according to the cyclo-retinoscopy and refraction results.

The axial length measurement confirmed the assumption of general exceeding axial growth compared to emmetropes with 22.7mm at age of 6-14 years of age⁸ or 23.23mm in 11-14 year Caucasian children³ and also the difference of refractive state is reflected and the axial length difference for roughly 3 diopters per 1 mm. Therefore a progressive myopia with exceeding axial elongation is diagnosed.

Early treatment of progressive myopia is suggested to avoid further axial elongation and long-term-sight threatening consequences such as an increased risk to develop myopic-macular degeneration^{9,10}, glaucoma, retinal tears and detachment. A combination of ortho-keratology and low dose Atropin slows down the progressive axial elongation more than atropine only^{11,12}. Along with these treatment options also lifestyle and behavioral changes are suggested to make breaks with reading, be cautious to reading distance and spending outdoor time¹³.

References

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Ophthalmologists Exam report

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Betreff: Frau , geboren 21.03.2010

Sehr geehrter Herr Ritzmann

Vielen Dank für die Zuweisung der oben genannten Patientin zur ophthalmologischen Abklärung vor Start mit Ortho-K Linsen. Wir haben 03.12.2020 untersucht.

Diagnose: rechts-links Myopie
Exophorie

Status:

Vordere Bulbusabschnitte	beidseits: reichfreie vordere Bulbusabschnitte, klar brechende Medien, Pupille rund, spielt.
Fundus	beidseits: Papille randscharf, vital, wenig exkaviert, Makula mit Zentral- und Wallreflex

Beurteilung:

eigene Brille:	rechts: -3.75sph -0.25cyl / 89° links: -3.25sph -0.50cyl / 80°
Skioskopie in Cycloplegie:	rechts: -5.75sph -0.25cyl / 20° links: -3.25sph -0.25cyl / 60°
neues Brillenrezept:	rechts: -5.75sph -0.25cyl / 20° links: -3.25sph -0.25cyl / 60°
Fernvisus:	rechts: 0.2 links: 1.25
Nahvisus:	rechts: 1.0 links: 1.0
Covertest:	Ferne: gut kompensierte Exophorie, alt. -1° Nähe: gut kompensierte Exophorie, alt. -1°
Motilität:	frei
Konvergenz:	gut
Stereofunktionen:	THO bis 60"
Pupillenmotorik:	isokor, kein Akkommodationsdefizit
Bulbuslänge:	rechts: 25.34mm links: 24.57mm

Wir haben nach 2.5 Jahren erneut in unserer Praxis untersucht. Mit der eigenen Brille zeigte sich eine Fernvisusminderung rechts aufgrund einer unterkompensierten Myopie. Wir haben der Patientin mittels Skioskopie in Cycloplegie ein neues Brillenrezept ausgestellt. Eine Verlaufskontrolle ist in sechs Monaten geplant. Sollte sich dann, trotz Ortho-K Linsen, eine starke Myopiezunahme zeigen, so empfehlen wir zusätzlich die Applikation von Atropin 0.02%.

Eine Verlaufskontrolle ist in sechs Monaten geplant.

Nochmals besten Dank für Ihre Zuweisung und freundliche Grüsse

Leandra Strasser
Depl. Orthoptistin HF

Dr. med. Roman Windisch
(elektronisch unterzeichnet)