

Effect of orthokeratology on myopia prevention and control in children and adolescents

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Abstract

Objective: To observe the effect of orthokeratology on myopia prevention and control in children.

Methods: the changes of ocular axis of 6 adolescent patients (12 eyes) who were fitted with orthokeratology lenses in the Tao outpatient department of the Eye Museum from November 2021 to September 2023 were retrospectively analyzed.

Results: the average follow-up time of 12 eyes was (11.67 ± 7.01) months, and the ocular axis was 25.35 ± 0.75 mm before matching; At the last follow-up, the axial length was 25.30 ± 0.84 mm, and the average increase of axial length was -0.04 ± 0.31 mm. There was no significant difference in axial length between baseline and the last follow-up ($z=0.628$, $p=0.53>0.05$).

Conclusion: orthokeratology lens has a certain control effect on the axial growth of children and adolescents.

Key word: orthokeratology lens; Ocular axis

Adolescents are the main population of myopia, with a high prevalence and a trend of younger development. If not well controlled, they are very likely to develop pathological myopia. Myopia has been considered as an important public health problem worldwide, as shown in the epidemiological survey. The myopia rate of primary and secondary school students in China is 85%. At present, there are many kinds of myopia control, such as common defocus frame glasses, orthokeratology lenses, low concentration atropine, etc. Among them, the effect of orthokeratology lens in myopia prevention and control is particularly obvious. Orthokeratology lens is a reversible non-surgical physical correction method that gradually flattens the corneal radius through inverse geometric design, so that the wearer can obtain clear naked vision and visual quality during the day, thereby delaying the deepening of myopia. This study retrospectively analyzed and compared the axial condition of children with orthokeratology lens in our outpatient clinic, in order to clarify the effect of orthokeratology lens on the prevention and control of myopia in children. The analysis is as follows^[1].

1 Data and methods

1.1 Clinical data The myopia patients who were examined with orthokeratology lenses in the Tao outpatient department of aiyan Guantao from November 2022 to September 2023 were collected. Inclusion and exclusion criteria: (1) age 6-18 years; (2) Patients with follow-up time ≥ 6 Mo; (3) There is no corneal complication during wearing. Exclusion criteria: (1) patients with incomplete examination data; (2) Use of

other drugs or instruments to control myopia during follow-up; (3) Patients with other systemic serious diseases.

1.2 Method Before fitting glasses, naked eye vision, non-contact intraocular pressure, computer optometry, ocular axis (IOL master 700 optical biometry, Zeiss, Germany), corneal topography and other examinations were carried out. According to the examination results, the appropriate brand and design of orthokeratology glasses were selected for trial wearing, and the final lens parameters were adjusted and determined according to the trial wearing results. The ocular axis information at baseline and the last follow-up were recorded.

1.3 Statistics Spss26.0 was used to analyze and process the data. The measurement data were expressed as mean \pm standard deviation. Wilcoxon rank sum test was used to analyze the data. $P < 0.05$ was taken as the difference with statistical significance.

2. results

A total of 6 patients (12 eyes) were collected, all male, aged 9-13 years, with an average of (10.83 ± 1.75) years. The patients were followed up for 6-24 months, with an average of (11.67 ± 7.01) months. The baseline ocular axis was 25.35 ± 0.75 mm; At the last follow-up, the axial length was 25.30 ± 0.84 mm, and the average increase of axial length was -0.04 ± 0.31 mm. There was no significant difference in axial length between baseline and the last follow-up ($z=0.628$, $p=0.53 > 0.05$). See Table 1 for details.

Table 1 list of patient information

No.	Age	Left/right Eye	AL before matching glasses (mm)	follow-up time (m)	AL after matching glasses (mm)	AL growth (mm)
1	13	OD	25.47	24	25.32	-0.15
		OS	25.15	24	25.11	-0.04
2	13	OD	26.9	24	27.01	0.11
		OS	26.49	24	26.62	0.13
3	11	OD	25.08	12	25.25	0.17
		OS	25.07	12	25.24	0.17
4	9	OD	25.29	8	25.39	0.10
		OS	25.08	8	25.12	0.04
5	10	OD	24.34	6	24.30	-0.04
		OS	24.30	6	24.21	-0.09
6	9	OD	25.60	6	25.61	0.01
		OS	25.40	6	24.43	0.03

3. Discussion

Myopia has become a major public health problem affecting the eye health of teenagers in China, and it is also one of the common eye diseases causing visual impairment. Epidemiological studies show that at present, the age of onset of juvenile myopia is gradually advanced, and the incidence is significantly increased. Orthokeratology lens is an ideal method in all control means. Orthokeratology lens is

a four arc rigid oxygen permeable corneal contact lens, which can be designed according to the patient's corneal morphology and diopter. It can be worn during sleep at night to change the corneal morphology, so as to restore the patient's daily naked vision, thereby controlling the progression of myopia [2-3].

The results of this study showed that in 6 patients (12 eyes), there was no significant difference in the length of the base eye axis after 6-24 months of follow-up compared with that before the lens, indicating that the orthokeratology lens has a certain control effect on the growth of the eye axis in children and adolescents. Previous studies have shown that the orthokeratology lens has a good control effect, but there are still patients who do not wear it on time or adhere to it, resulting in poor control effect. In the 12-month follow-up period, patient 3 in this study stopped wearing for 3 months, and the growth of ocular axis was significantly higher than that of other patients.

In conclusion, orthokeratology has a certain control effect on the axial growth of children and adolescents. However, the amount of observation data is small, and all are male, the follow-up time is short, and the last follow-up time is quite different, so the reference significance of statistics is not significant. The sample size needs to be further expanded. At the same time, it can also be considered to observe the changes of the eye axis of patients after stopping wearing, so as to better guide the fitting of orthokeratology lenses and patient education.

References

- [1] Zhang J, Shi XQ, Liu ZM, et al. Clinical observation of multi-zone positive optical defocus glasses and corneal orthokeratology in controlling adolescent myopia [J]. Chinese Journal of Ophthalmology, 2022, 50(6): 735-738.
- [2] Niu YL, Ye RS, Deng TM, et al. Efficacy of low-concentration atropine combined with corneal orthokeratology in the treatment of low to moderate myopia in adolescents [J]. International Journal of Ophthalmology, 2019, 19(11): 1940-1944.
- [3] Zhang TC, Liu YL, Yang LN. Analysis of the therapeutic effect of low-concentration atropine combined with corneal orthokeratology on the control of low to moderate myopia in adolescents [J]. Chinese Prescription Drug, 2021, 19(11): 121-124.