Effects of Orthokeratology Lens On Axial Length Elongation in Myopia With Anisometropia Children

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Research Article

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Abstract

Aim

To investigate the effect of orthokeratology (OK) lens on axial length (AL) elongation in myopia with anisometropia children.

Methods

Thirty-seven unilateral myopia (group 1) and fifty-nine bilateral myopia with anisometropia children were involved in this 1-year retrospective study. And bilateral myopia with anisometropia children were divided into group 2A (diopter of the lower SER eye under − 2.00D) and group 2B(diopter of the lower SER eye is equal or greater than − 2.00D). The change in AL were observed.The datas were analysed using SPSS 21.0.

Results

(1) In group 1, the mean baseline AL of the H eyes and L eye were 24.70 ± 0.89 mm and 23.55 ± 0.69 mm, respectively. In group 2A, the mean baseline AL of the H eyes and L eyes were 24.61 ± 0.84 mm and 24.00 ± 0.70 mm respectively. In group 2B, the mean baseline AL of the H eyes and L eyes were 25.28 ± 0.72 mm and 24.70 ± 0.74 mm. After 1 year, the change in AL of the L eyes was faster than the H eyes in group 1 and group 2A (all $P<0.001$).While the AL of the H eyes and L eyes had the same increased rate in group 2B. (2) The effect of controlling AL elongation of H eyes is consistent in three groups ($P = 0.559$).The effect of controlling AL elongation of L eyes in group 2B was better than that in group 1 and group 2A ($P < 0.001$). And the difference between group 1 and group 2A has no statistical significance. (3) The AL difference in H eyes and L eyes decreased from baseline 1.16 ± 0.55mm to 0.88 ± 0.68mm after 1 year in group 1.And in group 2A, the AL difference in H eyes and L eyes decreased from baseline 0.61 ± 0.34mm to 0.48 ± 0.28mm. There was statistically significant difference (all $P<0.001$). In group 2B, the baseline AL difference in H eyes and L eyes has no significant difference from that after 1 year ($P = 0.069$).

Conclusions

Monocular OK lens is effective on suppression AL growth of the myopic eyes and reduce anisometropia value in unilateral myopic children. Binocular OK lenses only reduce anisometropia with the diopter of the low eye under − 2.00D. Binocular OK lenses cannot reduce anisometropia with the diopter of the low eye equal or greater than − 2.00D. Whether OK lens can reduce refractive anisometropia value is related to the spherical equivalent refractive of low refractive eye in bilateral myopia with anisometropia children after 1-year follow-up.

Introduction

Myopic anisometropia is defined as a difference in myopic spherical equivalent refractive error of 1.00D or more between both eyes[1−2]. High anisometropia could result in a marked difference in the retinal image size and bring about asthenopia, amblyopia, and impairment of stereopsis[3]. The mechanism of anisometropia is considered to be the asymmetric AL elongation caused by unbalanced development of emmetropization during childhood[4,5]. Research shows that the prevalence rate and myopic anisometropia value increased as myopia increases over time [1,6−8].

Various measures such as glasses, rigid gas permeable contact lens (RGP) and OK lens have been used to correct myopic anisometropia. Due the aniseikonia produced by lens, the glasses might not be accepted by many patients[9]. The RGP[10]cannot control myopia progression and is not tolerated by some patients. Recently, studies[11−13] have found that monocular OK lens can reduce anisometropia value in unilateral myopic children.But the effect of binocular OK lens on reducing anisometropia value in bilateral myopic children is still controversial.Since the OK lens has better effect for myopia patients with the diopter equal or greater than − 2.00D in controlling the AL elongation[14], the effect of OK lens on reducing anisometropia value in myopia with anisometropia children may be related to the diopter. For example, when the diopter of the lower spherical equivalent refractive (SER) eye equal or greater than − 2.00D, the anisometropia value cannot be reduced in bilateral myopic children.When the diopter of the lower SER eye under − 2.00D, the anisometropia value can be reduced. To prove the above hypothesis, the following study aims to analysis the effects of OK lens on AL elongation in unilateral myopia and bilateral myopia with anisometropia children (including bilateral myopia with the diopter of the lower SER eye under − 2.00D and over − 2.00D). Our findings would clarify whether the AL of two eyes had the same increased rate and whether the anisometropia value would change after wearing OK lens in myopia with anisometropia children.

Methods

Data was collected from thirty-seven unilateral myopia and fifty-nine bilateral myopia with anisometropia children who visited the Second Affiliated Hospital of Fujian traditional Chinese Medicine University between January 2017 and January 2020 and met the inclusion criteria of this retrospective cohort study (8–18 years of age; SER of myopic eyes less than − 6.50D;astigmatism of less than 2.0D; binocular refraction difference more than 1.0D; monocular best corrected visual acuity of 20/20 or better; no other eye diseases and surgery; no ocular and systemic conditions that might affect vision or vision development; no history of using atropine, RGP and OK lens to control myopia progression). This study was approved by the Medical Ethics committee of the Second Affiliated Hospital of Fujian traditional Chinese Medicine University and conformed to the tenets of the Declaration of Helsinki.

The children were divided into the unilateral myopia (group 1: only myopic eye with OK lens) and bilateral myopia with anisometropia (group 2: both eyes with OK lens). Then, the children in group 2 were divided into two groups based on diopter of the lower SER eye (group 2A: diopter of the lower SER eye under − 2.00D, group 2B:diopter of the lower SER eye is equal or greater than − 2.00D).The OK lenses used in this study were Euclid Systems Orthokeratology contact lenses for overnight wear (Boston Equalens material, Euclid Systems Corp., USA) with Dk of 95×10^{-11} (cm^2/s)[(mLO_2/(mL·hPa)]@35°C. All of children were fitted with the lenses by ophthalmic technician.The patients were advised to wear their OK lenses every night for at least 8 consecutive hours. They were also required to attend routine aftercare (1 day, 1 week, 1 month, and every 3 months after lens delivery) and unscheduled visits when necessary to ensure good ocular response and health.

Corneal thinnest point thickness, corneal diameter, minimal corneal curvature and e value, were measured by Sirius system corneal topography (C.S.O., Italy).AL were evaluated using a optical biometry (IOLMaster, Carl Zeiss, Germany).Intraocular pressure (IOP) was measured by non-contact tonometer (TX-20, Janpan). On each occasion, three successive measurements were taken and their mean was used as a representative value. Cycloplegic autorefraction was performed after the instillation of six drops of tropicamide eye drops (Shanghe, China) separated 10 min apart in each of the patients'eyes. Ten minutes after the instillation of the sixth drop, three autorefraction measurements were taken (Topcon KR-800, Japan) and a mean was obtained. The degree of myopia was expressed by SER.

Continuous variables of baseline characteristics were expressed as mean ± standard deviation (SD) and evaluated by one-way ANOVA analysis or Kruskal-Wallis H rank test between three groups and paired t-test or Wilcoxon signed-rank test between two eyes .Categorical variables, such as sex and side of high SER eye were evaluated by the Chi-squared test. Paired t-test or Wilcoxon signed-rank test were applied to estimate the change in AL among different groups and eyes. A value of $P < 0.05$ was considered statistically significant. All analyses were performed using SPSS 21.0.

Results

Table 1 shows a summary of the baseline data of the subjects. No significant differences were found in the baseline parameters such as corneal thinnest point thickness, corneal diameter, minimal corneal curvature, e value and intraocular pressure between H eyes and L eyes in each group and between three groups in each eye (one-way ANOVA analysis or Kruskal-Wallis H rank test, all $P > 0.05$). The average anisometropia value was 2.41 ± 1.17D, 1.73 ± 0.75D and 1.41 ± 0.47 D in group 1, group 2A and group 2B, respectively. The H eyes in three groups were more common in the right eyes (right/left: 21/16, 18/10 and 20/11 in group1, group 2A and group 2B). There were more females with myopia with anisometropia (female/male: 19/18 ,17/11 and 18/13 in group1, group 2A and group 2B).

In group 1, the mean ± SD (min-max) baseline SER of the H eyes and L eyes were − 2.51 ± 1.38D (− 1.00D to − 6.00D) and−0.18 ± 0.40 (− 1.00D to + 0.62D). The mean ± SD (min-max) baseline AL of the H eyes and L eye were 24.70 ± 0.89 mm (23.30 mm–27.69mm) and 23.55 ± 0.69 mm (22.48 mm–25.37 mm). Significant differences were found in SER and AL between H eyes and L eyes in each group (SER by Wilcoxon signed-rank test, AL by paired t-test, $P < 0.001$) and between three groups in each eye (one-way ANOVA analysis or Kruskal-Wallis H rank test, all $P < 0.05$)(Table 1). After 1 year, the change in AL of the L eyes was faster than the H eyes (0.35 ± 0.28mm VS. 0.07 ± 0.35mm, paired t-test, $P<0.001$) (Table 2).

In group 2A, the mean ± SD (min-max) baseline SER of the H eyes and L eyes were − 2.80 ± 0.80D (− 1.75D to − 4.50D) and−1.07 ± 0.39D (− 0.50D to − 1.75D). The mean ± SD (min-max) baseline AL of the H eyes and L eyes were 24.61 ± 0.84 mm (23.11 mm–26.35 mm) and 24.00 ± 0.70 mm (22.85 mm–25.50 mm). There was significant difference of baseline SER and baseline AL in H eyes and L eyes (Wilcoxon signed-rank test, P < 0.001). (Table 1)After 1 year, the change in AL of the L eyes was faster than the H eyes (0.29 ± 0.14mm VS. 0.16 ± 0.25mm, paired t-test,t=−5.152, P<0.001) (Table 2).

In group 2B, the mean ± SD (min-max) baseline SER of the H eyes and L eyes were − 4.53 ± 0.76D (− 3.25D to − 6.00D) and−3.11 ± 0.87D (− 2.00D to − 5.00D). The mean ± SD (min-max) baseline AL of the H eyes and L eyes were 25.28 ± 0.72 mm (23.70 mm–26.72 mm) and 24.70 ± 0.74 mm (23.20 mm–26.21 mm). There was significant difference of baseline SER and baseline AL in H eyes and L eyes (SER by Wilcoxon signed-rank test, AL by paired t-test, P < 0.001).(Table 1) After 1 year, the AL of the H eyes and L eyes had the same increased rate (0.10 ± 0.26mm VS.0.15 ± 0.27mm, Wilcoxon signed-rank test, Z=−1.821, P = 0.069). (Table 2).

Table 3 shows that the effect of controlling AL elongation of H eyes is consistent (Kruskal-Wallis H rank test, P = 0.559).The effect of controlling AL elongation of L eyes in group 2B was better than that in group 1and group 2A (Kruskal-Wallis H rank test, P < 0.001).And the difference between group 1 and group 2A has no statistical significance.

The AL difference in H eyes and L eyes decreased from baseline 1.16± 0.55mm to 0.88 ± 0.68mm after 1 year in group 1.And in group 2A, the AL difference in H eyes and L eyes decreased from baseline 0.61 ± 0.34mm to 0.48 ± 0.28mm. There was statistically significant difference (paired t-test, all P<0.001). In group 2B, the baseline AL difference in H eyes and L eyes has no significant difference from that after 1 year (Wilcoxon signed-rank test, P = 0.069). (Table 4)

Discussion

The ideal correction goals for anisomyopic myopia children were to balance visual acuity in both eyes, control the progression of myopia and reduce the anisometropia. At present, OK lenses and multifocal soft contact lenses have particular advantage in slowing down myopia progression compared to the use of single-vision spectacle lenses and RGP lenses[15]. The effect of OK lenses on AL elongation in myopia with anisometropia children is controversial. This study has demonstrated that OK lenses can reduce anisometropia in unilateral myopic children when treated with monocular OK lens.This result was similar to other studies[16]. However, the phenomenon that the binocular OK lens reduce anisometropia only was showed in group 2A (the diopter of the lower SER eye under − 2.00D). Furthermore, the binocular OK lens in group 2B (the diopter of the lower SER eye is equal or greater than − 2.00D) control the AL elongation in both eyes at the same rate, but not reduce anisometropia. One study clarified that the OK lenses have better effect for myopia patients with the diopter over − 2.00D in controlling the AL elongation[14]. The results of this study are similar to it.In three group, the mean of SER at baseline of H eyes all over − 2.00D. And after 1 years, the difference of AL elongation between groups has no significant. Moreover, only the mean of SER at baseline of L eyes in group 2B exceeds − 2.00D, the AL elongation significantly less than group 2A (the mean of SER at baseline of L eyes under − 2.00D). Hence, OK lenses reducing anisometropia is likely to be connected with individual difference in the diopter of the lower SER eye.

In these unilateral myopia case, the myopic eye wear OK lens can slow down AL growth, while the contralateral eye will continue to grow faster than myopic eye, resulting in reduce the anisometropia. Chen.et al. [17]found that if the fellow eye also developed myopia in the future, the OK lens could slow down AL growth in that eye as well. It was found that the AL growth in group 2A less than that in group 1,but no significant. Therefore, the differences between the two results need to be further discussed. It may be link with the effect of OK lenses on myopia with different refractive degrees.However, the cause of different control effect of OK lenses on different diopter eyes is still not completely clear. Some research pointed out that the OK lenses in higher refractive eyes may produce more myopic visual defocus, thus have a better myopia delay effect [18].

At the same time, for bilateral myopia with anisometropia children wearing OK lens for 1 year, it was found that AL elongation was greater in the low myopic eyes than in the high myopic eyes.But there was no significant difference in group 2B. This was consistent with these studies of Fu[11]and Zhong[12]. Fu et al. [11] observed 25 bilateral myopia with anisometropia children, the SER of low eye was (− 2.73 ± 1.38)D, after 1 year, the AL of the H eyes and L eyes had the same increased rate (0.09 ± 0.14mm VS 0.13 ± 0.16mm). Zhong[12] observed 29 bilateral myopia with anisometropia children, the SER of low eye was (− 1.93 ± 1.02)D, after 24 months, AL had increased by 0.31 ± 0.23 mm in the high eye group was significantly less than that in by in the low eye group (0.41 ± 0.31 mm). Therefore, the diopter of the lower SER eye may affect the result of wearing OK lenses and then reducing anisometropia. In other words,the control effect of OK lens on different refractive index myopia is different, so whether OK lenses can reduce the double eye refractive parameter difference depends on the control effect of OK lenses on both eyes.

The limitations of this study are as follows. First, this study was the relatively small sample size and the lack of a control group wearing single vision spectacles or monofocal soft contact lenses. More cases should be analysed. And this study is retrospective in nature. More prospective and randomized studies are needed to verify these results. Second, the follow-up period was only 1 years. Long-term studies are needed in the future.Finally, since we cannot fully explain the mechanisms underlying the phenomena that the different effect of OK lenses on different degree myopia. Further fundamental research is warranted.

In conclusion, this study on analysis of myopia with anisometropia shows that monocular OK lens is effective on suppression AL growth of the myopic eyes and reduce anisometropia value in unilateral myopic children. Binocular OK lenses only reduce anisometropia with the diopter of the low eye under − 2.00D. Binocular OK lenses cannot reduce anisometropia with the diopter of the low eye equal or greater than − 2.00D. Whether OK lens can reduce refractive anisometropia value is related to the spherical equivalent refractive of low refractive eye in bilateral myopia with anisometropia children after 1-year follow-up.

Declarations

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Declaration of Competing Interest

None declared.

References

1. Donoghue 1O', McClelland L, Logan JF NS, et al. Profile of anisometropia and aniso-astigmatism in children: prevalence and association with age, ocular biometric measures, and refractive status. Invest Ophthalmol Vis Sci. 2013 Jan 21;54(1):602-8. doi: 10.1167/iovs.12-11066. PMID: 23233258
2. Wu 2HuYY, Lu JF TL, et al (2016 Mar;57(3):979 – 88) Prevalence and Associations of Anisometropia in Children. Invest Ophthalmol Vis Sci. doi: 10.1167/iovs.15-18647. PMID: 26962694
3. Szymkiw 3LovasikJV M. Effects of aniseikonia, anisometropia, accommodation, retinal illuminance, and pupil size on stereopsis. Invest Ophthalmol Vis Sci. 1985 May;26(5):741–50. PMID: 3997423
4. Collins 4VincentSJ, Read MJ SA, et al (2014 Jul;97(4):291–307) Myopic anisometropia: ocular characteristics and aetiological considerations. Clin Exp Optom. doi: 10.1111/cxo.12171. PMID: 24939167
5. Cankurtaran 5TekinK, Inanc V (2017 Apr) M, et al. Effect of myopic anisometropia on anterior and posterior ocular segment parameters. Int Ophthalmol 37(2):377–384 doi: 10.1007/s10792-016-0272-x. Epub 2016 Jun 4. PMID: 27262559
6. Gwiazda 6DengL JE. Anisometropia in children from infancy to 15 years. Invest Ophthalmol Vis Sci (2012) Jun 20;53(7):3782-7. doi: 10.1167/iovs.11-8727. PMID: 22589429; PMCID: PMC3390183
7. Fotouhi 7YektaA, Hashemi A H, et al (2010 Sep;18(3):104 – 10) The prevalence of anisometropia, amblyopia and strabismus in schoolchildren of Shiraz, Iran. Strabismus. doi: 10.3109/09273972.2010.502957. PMID: 20843187
8. Kauppinen 8PärssinenO (2017 Aug) M. Anisometropia of spherical equivalent and astigmatism among myopes: a 23-year follow-up study of prevalence and changes from childhood to adulthood. Acta Ophthalmol 95(5):518–524. doi:10.1111/aos.13405. Epub 2017 May 8. PMID: 28481050
9. Ownagh 9KarimianF, Amiri V MA, et al. Stereoacuity after Wavefront-guided Photorefractive Keratectomy in Anisometropia. J Ophthalmic Vis Res. 2017 Jul-Sep;12(3):265–269. doi: 10.4103/jovr.jovr_138_16. PMID: 28791058; PMCID: PMC5525494

10. Naidu 10WangB, Qu RK (2018 Apr) X. The use of rigid gas permeable contact lenses in children with myopic amblyopia: A case series. Cont Lens Anterior Eye 41(2):224–228. doi:10.1016/j.clae.2017.05.007. Epub 2017 Jun 26. PMID: 28662862
11. Qin 11FuAC, Rong J (2020 Feb) JB, et al. Effects of orthokeratology lens on axial length elongation in unilateral myopia and bilateral myopia with anisometropia children. Cont Lens Anterior Eye 43(1):73–77 doi: 10.1016/j.clae.2019.12.001. Epub 2019 Dec 17. PMID: 31862203
12. Ke 12ZhongY, Qiong L (2020 Feb) W, et al. Orthokeratology lens for management of myopia in anisometropic children: A contralateral study. Cont Lens Anterior Eye 43(1):40–43 doi: 10.1016/j.clae.2019.03.003. Epub 2019 Mar 22. PMID: 30910277
13. Jin 13LuW (2020 Jun) W. Clinical observations of the effect of orthokeratology in children with myopic anisometropia. Cont Lens Anterior Eye 43(3):222–225. doi:10.1016/j.clae.2020.03.002. Epub 2020 Mar 12. PMID: 32173255
14. Li 14ZhangZ, Shi L S, et al. Efficacy and safety of orthokeratology in adolescent myopia with different diopter.J Tongji Univ (Med Sci)(Chinese).2018,39(03),74–78 DOI:10.16118/j.1008-0392.2018.03.014
15. Zhao 15GuanM, Geng W (2020 Jan) Y, et al. Changes in axial length after orthokeratology lens treatment for myopia: a meta-analysis. Int Ophthalmol 40(1):255–265. doi:10.1007/s10792-019-01167-9. Epub 2020 Jan 8. PMID: 31916062
16. Wang 16TsaiWS, Lee JH (2019 Jul) YC, et al. Assessing the change of anisometropia in unilateral myopic children receiving monocular orthokeratology treatment. J Formos Med Assoc 118(7):1122–1128. doi:10.1016/j.jfma.2019.02.001. Epub 2019 Feb 16. PMID: 30782426
17. He 17ChenJ, Chen JC Y, et al. Interocular Difference of Peripheral Refraction in Anisomyopic Eyes of Schoolchildren. PLoS One. 2016 Feb 16;11(2):e0149110. doi: 10.1371/journal.pone.0149110. PMID: 26881745; PMCID: PMC4755577
18. Chen 18FuAC, Lv XL (2016 Feb) Y, et al. Higher spherical equivalent refractive errors is associated with slower axial elongation wearing orthokeratology. Cont Lens Anterior Eye 39(1):62–66 doi: 10.1016/j.clae.2015.07.006. Epub 2015 Aug 4. PMID: 26254302

Tables

Table 1
Baseline characteristics of participants [mean ± SD]

	Group 1	Group 2A	Group 2B	P-value
Age (years)	11.7 ± 2.4	11.5 ± 2.0	10.9 ± 1.9	F = 1.119,P = 0.331
Sex(Female/Male)	19/18	17/11	18/13	χ^2=0.307,P = 0.737
Corneal thinnest point thickness (μm)				
High SER (H eye)	564.7 ± 32.8	562.6 ± 28.3	563.5 ± 32.9	F = 0.036,P = 0.965
Low SER (L eye)	562.5 ± 30.7	566.1 ± 29.2	564.8 ± 33.0	F = 0.109,P = 0.897
Corneal diameter (mm)				
High SER (H eye)	11.98 ± 0.39	11.95 ± 0.47	11.85 ± 0.42	F = 0.761,P = 0.470
Low SER (L eye)	11.98 ± 0.37	11.92 ± 0.43	11.78 ± 0.38	F = 2.307,P = 0.105
Minimal corneal curvature (D)				
High SER (H eye)	42.45 ± 1.20	42.76 ± 1.22	42.81 ± 1.20	F = 0.902,P = 0.409
Low SER (L eye)	42.44 ± 1.17	42.60 ± 1.27	42.73 ± 1.16	F = 0.480,P = 0.621
E value				
High SER (H eye)	0.55 ± 0.12	0.54 ± 0.07	0.56 ± 0.11	χ^2=2.116,P = 0.347
Low SER (L eye)	0.53 ± 0.17	0.54 ± 0.07	0.56 ± 0.10	χ^2=1.083,P = 0.582
SER (D)				
High SER (H eye)	-2.59 ± 1.21	-2.80 ± 0.80	-4.53 ± 0.76#▲	χ^2=43.782,P<0.001
Low SER (L eye)	−0.18 ± 0.40*	−1.07 ± 0.39*#	−3.11 ± 0.87*#▲	χ^2=79.456,P<0.001
Anisometropia value (D)	2.41 ± 1.17	1.73 ± 0.75#	1.41 ± 0.47#	χ^2=17.073,P<0.001
Axial length baseline (mm)				
High SER (H eye)	24.70 ± 0.89	24.61 ± 0.84	25.28 ± 0.72#▲	χ^2=13.593,P = 0.001

	Group 1	Group 2A	Group 2B	P-value
Low SER (L eye)	23.55 ± 0.69*	24.00 ± 0.70*#	24.70 ± 0.74*#▲	F = 22.493,P<0.001
Side of high SER eye (Right /Left eye)	21/16	18/10	20/11	χ^2=0.562,P = 0.755
Intraocular pressure (mmHg)				
High SER (H eye)	17.22 ± 3.13	18.43 ± 3.60	16.65 ± 3.36	F = 2.146,P = 0.123
Low SER (L eye)	17.27 ± 3.85	18.04 ± 3.91	16.65 ± 3.11	F = 1.067,P = 0.348
Note: SER: spherical equivalent refractive error. #compared with Group1,P<0.001; ▲compared with Group2A,P<0.001; *compared with High SER eye, P<0.001.				

Table 2
Change in axial length (AL) in H eyes and L eyes of the three groups.

		High SER (H eye)	Low SER (L eye)	P-value
Group 1 (n = 37)	AL at baseline (mm)	24.70 ± 0.89	23.55 ± 0.69	
	AL at 1 year (mm)	24.77 ± 1.04	23.90 ± 0.71	
	Change in AL at 1 year (mm)	0.07 ± 0.35	0.35 ± 0.28	t=−4.575,P<0.001
Group 2A (n = 29)	AL at baseline (mm)	24.61 ± 0.84	24.00 ± 0.70	
	AL at 1 year (mm)	24.77 ± 0.91	24.29 ± 0.85	
	Change in AL at 1 year (mm)	0.16 ± 0.25	0.29 ± 0.14	t=−5.152,P<0.001
Group 2B (n = 31)	AL at baseline (mm)	25.28 ± 0.72	24.70 ± 0.74	
	AL at 1 year (mm)	25.38 ± 0.74	24.86 ± 0.77	
	Change in AL at 1 year (mm)	0.10 ± 0.26	0.15 ± 0.27	Z=−1.821,P = 0.069

Table 3
Comparison of three groups on axial length (AL) control

	Group 1 (n = 37)	Group 2A (n = 29)	Group 2B (n = 31)	P-value
High SER (H eye)	0.07 ± 0.35	0.16 ± 0.25	0.10 ± 0.26	0.559
Low SER (L eye)	0.35 ± 0.28	0.29 ± 0.14	0.15 ± 0.27*#	0.001
Note: *compared with Group 1, P<0.05. #compared with Group 2A, P<0.05.				

Table 4
Change in axial length (AL) difference of the three groups.

	D_{AL} at baseline (mm)	D_{AL} at 1 year (mm)	P-value
Group 1 (n = 37)	1.16 ± 0.55	0.88 ± 0.68	t = 4.575,P<0.001
Group 2A (n = 29)	0.61 ± 0.34	0.48 ± 0.28	t = 5.152,P<0.001
Group 2B (n = 31)	0.58 ± 0.31	0.53 ± 0.26	Z=−1.821,P = 0.069
Note: D_{AL}: The AL difference in H eyes and L eyes.			