

# Preliminary report of computer software assisted orthokeratology lens fitting in Taiwanese school-aged children

以電腦軟體協助驗配之角膜塑型術於台灣學齡兒童使用之初步報告



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■ Introduction

In myopia control, overnight orthokeratology (OOK) had proved to be effective in suppressing axial length elongation in childhood myopia (1,2) compared with wearing spectacles, average slower increase in 43% of axial length (2). It could be used as an alternative to for those who are reluctant to receiving atropine therapy, which may cause photophobia and decreased accommodation.

A suggested mechanism underlying the effects of OOK in retarding myopia progression involves the observation that the corneal morphology after OOK can eliminate or decrease relative peripheral hyperopia. (3) Central corneal thinning and mid-peripheral thickening cause epithelial change and make structural change of cornea.(4) The forces include fluid forces of the tear film, lid pressure in the closed-eye environment, and surface tension of the tear film at the lens edge may act by both compression and tension at different sites across the corneal surface, and the stress created by these forces moves the corneal epithelium

Like conventional rigid lens fitting, OOK fitting may require a diagnostic set provided by the manufacturer. With the numerous possible combinations of lens parameters involved, many trial lenses are needed and this may pose a problem of storage. Chair time is also increased if a number of attempts are required to achieve the optimal fitting. As computerized fitting approach is becoming more popular, it is necessary to evaluate the clinical performance of OOK fitted using this fitting method.

We are presenting the 1-month data of school aged children who are undergoing OOK treatment which fitted with computer assisted system.

■ Method

School-aged children were fitted with the OOK lens using computerized assisted fitting. Entry criteria include: 1) Age between 6-11 years old 2) Refractive errors with cycloplegic autorefraction, myopia within 0.50-4.00 diopter and astigmatism within 1.25 diopter 3) Best corrected visual acuity no worse than logMAR 0.1. Appropriate lens designs were ordered according to computer software analysis result with Optact Optikon Keratron Scout topographic analyzer. Lens centration, myopic reduction, uncorrected visual acuity(UCVA), spherical equivalent, ocular health status were recorded. Lens parameters for Boston Diamond Orthokeratology (oprifocon A) shaping lenses were determined by the preinstalled software. At the delivery visit, fluorescein pattern of each lens on the eye was examined

Patients were required to wear the lenses every night for at least eight hours. They were followed-up in our clinic after the one day, one week and one month of lens wear. Refraction, corneal topography, visual acuity and external ocular health assessment were performed at each of these visits. The lens performance was reviewed at the one-month visit and refit was indicated only if lens decentration persisted or if there is residual myopia for more than 0.50 dipoter. Cease lens wear would be suggested if intolerable allergic conjunctivitis or >grade 3 corneal staining were noted. Artificial tear, sulfonamide eye drop and contact lens solution were provided for lens care. Antihistamine eye drop was prescribed if allergic conjunctivitis was noted.

■ Results

A total of 5 patients with 10 eyes were enrolled. Mean age was 10.6 ± 1.2 years old. The average initial spherical equivalent (SE) was -1.71 ± 0.76 D. The first fit success rate was 100%. (10/10) (Figure.1 ) UCVA before lens use was logMAR 0.85±0.35. Log MAR UCVA after one night and one week was 0.21±0.14 and 0.03±0.05, respectively. SE reduction and one day and one week were 52% and 81%. At the one month visit, the mean reduction in SE was 91.8% with logMAR UCVA was 0.03 ± 0.04. No central cornea staining was found during the follow-up visits. Peripheral punctuate keratitis was noted in one eye at nasal-inferior quadrant due to trichiasis and improved after epilation. No major complication such as infectious keratitis was noted.

■ Discussion

Fitting system can be divided mainly to diagnostic set fitting, empirical fitting and computer-assisted fitting. When using diagnostic set fitting, we select the first trial lens from diagnostic set or inventory dispensing set and can soon assess the fitting of the fluorescein

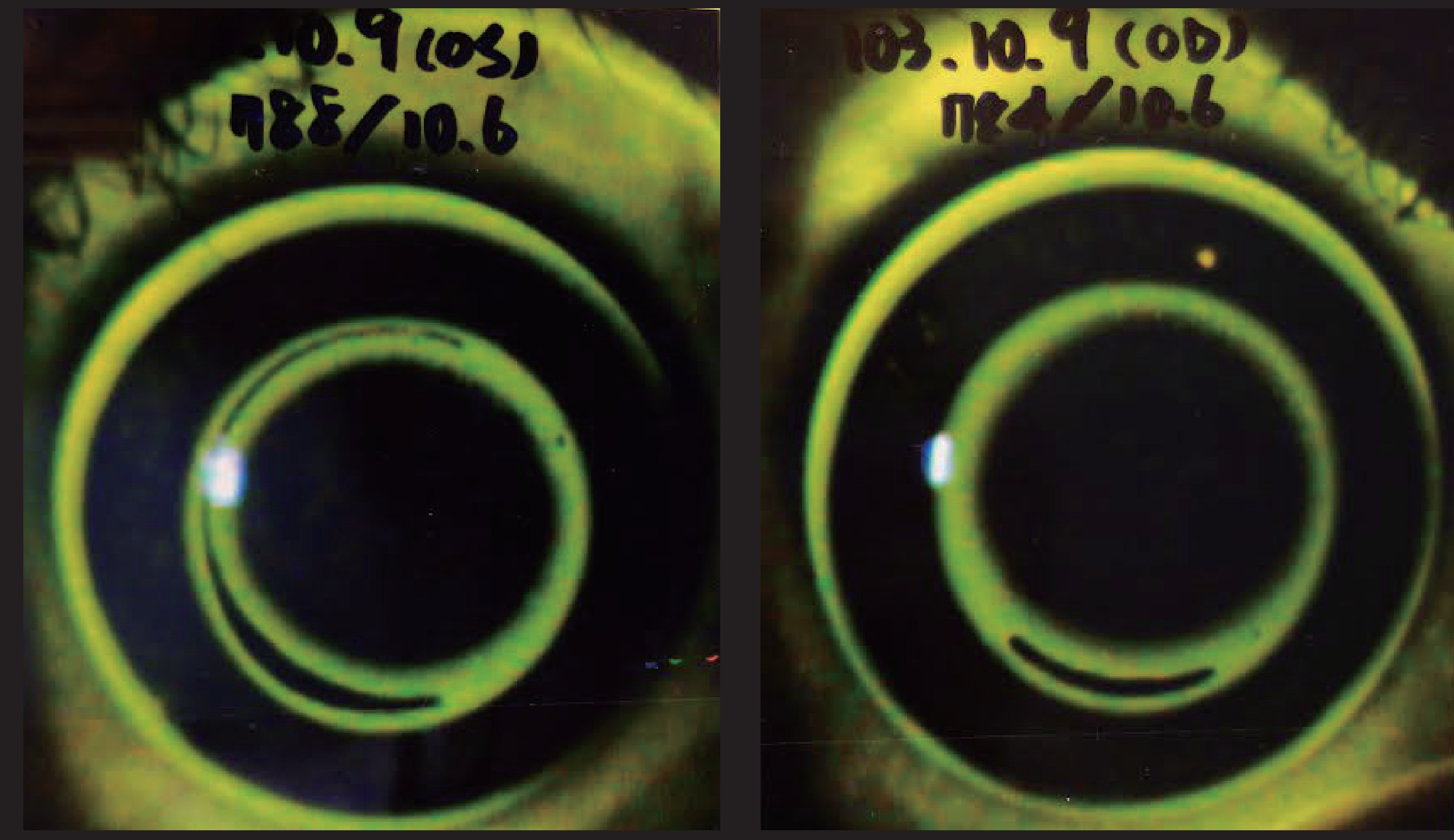
pattern on the same day or after the overnight lens wear, and patients can experience the lens in the eye before ordering; However, we sometimes need to keep a large diagnostic set, sometimes could exceed 100 lenses for a full set of OOK diagnostic set. And if trial lens maintenance and storage in wet storage, required regular disinfection/cleaning. Possible lens contamination or transmission of pathogens may result if the lenses were not maintained properly.

In computer-assisted fitting, topographical and refractive data were imputed to the software which calculating lens parameter. We could use the lenses that we received from the manufacturer as trial lens, if centration is not good enough. In our series, high success rate of OOK lens fit was noted with good centration, and the reduction of SE is comparable to other studies (5). The data in this series revealed that computer-assisted lens fitting could be an alternative choice to traditional diagnostic set fitting.

Regarding corneal staining, a study revealed that the incidences of corneal staining were 9-20% at different visits during the first month of lens wear. (6) In our study, one of ten eyes had peripheral corneal staining which aggravate by trichiasis and relieved after epilation was noted, and no intolerable foreign body sensation was told by the patient. No other adverse event was found during the first month of lens wear.

In conclusion, computer assisted system for OOK lens fitting gave a high first fit success rate and was effective in myopic reduction and provided stable vision after one month of lens wear.

▼ (Figure.1)  
Bull's eye pattern indicating nice centration of OOK lens



▼ Table 1. Patient's demographic data and SE reduction at first month visit of lens wear

No	Age	Gender	Lens Wearing side	First visit UCVA (LogMAR)	First visit SE	1-month visit UCVA (LogMAR)	1-month visit SE	SE reduction percentage at 1-month (%)
1	12	F	OD	1.3	-3.0	0	0	100
			OS	1.3	-3.0	0	0	100
2	11	F	OD	1.0	-2.0	0.1	-0.25	88
			OS	1.0	-2.1	0.1	-0.4	81
3	9	M	OD	1.0	-1.0	0	0	100
			OS	1.0	-1.25	0	-0.25	80
4	12	F	OD	0.3	-1.0	0	0	100
			OS	0.2	-0.8	0	0	100
5	9	F	OD	0.7	-1.5	0	-0.25	83
			OS	0.7	-1.5	0	-0.25	83

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