The effects of overnight piggyback orthokeratology on lens centration, comfort, myopia reduction, and central corneal integrity

Objective
To study and compare the effects of piggyback (POK) and conventional (COK) orthokeratology in terms of lens centration, comfort, myopia reduction and central corneal integrity.

Method
7 adult (age 18-35) subjects were recruited with moderate myopia (-3.00D to -5.00D), with-the-rule corneal astigmatism ≤ -1.50D, and anisometropia < 1D. The right eye of each subject was fitted with COK system while the left eye was fitted with POK system. Each subject needed to have four visits to our clinic. The first two visits were the fitting and lens delivery sessions. The 3rd and 4th aftercare visits were arranged on the 1st day and the 1st week, respectively, after successfully overnight wear of the orthokeratology lenses.

Result
After one week overnight wearing of orthokeratology lenses, the average myopia reduction effect on the eyes with POK system were about 3D, which was both statistically and clinically significant (compared to about 4D in the eyes with COK system). The averaged horizontal decentrations on POK system were found to be about 50% less than the eyes with COK system. However, vertical decentration of the treatment area on POK system was significantly larger than COK system. Subjective comfort on POK system was significantly better than COK system. Regarding the corneal integrity, central corneas on six subjects were significantly thicker in POK system compared with baseline while five subjects showed thinner central corneas in COK system. Significant central corneal staining was also revealed in both systems.

Conclusion
The study showed that practitioner may utilize the POK system to reduce horizontal decentration (but not vertical decentration) during the treatment with similar myopia reduction effect and better comfort compared with the COK system. However, practitioners should be aware of the compromising corneal health, which may be arisen from the increased hypoxia effect by the POK system.