ARGOS Provides Higher Axial Length Acquisition Rate than other Non-contact Biometers

Summary

Previous studies have shown that Swept-Source (SS) OCT biometers yield improvements in axial length (AL) acquisition rates over conventional PCI and OLCR non-contact biometers.[1] In this white paper, we report on a study at Chukyo Hospital in Nagoya, Japan, comparing AL acquisition rate for two SS-OCT biometers; ARGOS (MOVU) and "System B," another SS-OCT biometer recently brought to market. ARGOS demonstrated a 97.2% AL acquisition rate in a study that included 143 eyes. In the same study, System B AL acquisition rate was 94.4%. For grade IV cataracts and above, the success rate was 92.6% for ARGOS, while System B's rate dropped to 77.8%.

[1] Shammas et al. J Cataract Refract Surg 2016, 42:50-61

Advantages of ARGOS

ARGOS uses Swept-Source (SS) OCT at 1050 nm to capture an image of the whole eye from the cornea to the retina. This image is then used to extract the biometric parameters necessary for IOL power calculation. In addition to the inherent advantages of the SS-OCT technique in speed and sensitivity over other non-contact techniques, ARGOS is specifically optimized for penetrating dense cataracts. Its 1050 nm light experiences less scattering than shorter wavelengths. This makes more photons available for the measurement and increases the signal intensity. The wide scan of the measurement beam across the cornea also improves the robustness against localized cataracts and other anomalies. The beam at a single position can be blocked by a cataract or vitreous hemorrhage and the resulting signal may not reflect the true structure of the eye. By scanning the measurement beam, the light bypasses the localized anomalies and clearly visualizes them. Combined with the fast real-time OCT imaging during alignment, the user can achieve a high level of confidence in fixation status and accuracy of the measurement. These strengths are fundamentally based on the fidelity of the core of a SS-OCT system; the light source. The swept-source laser for ARGOS was developed in-house (Santec Corp, Komaki, Japan), targeting the deep (>50 mm) imaging range and fast scanning at 3000 lines per second. ARGOS even measures the densest cataract that usually necessitates the use of additional ultrasound A-scan.

Findings

In the study of 143 eyes, ARGOS was compared to System B for the acquisition rate of axial length (AL). Each measurement was taken without using the Enhanced Retinal Visualization mode, a feature on ARGOS that further increases the sensitivity at the retina by a factor of 10. Figure 1 shows the success rate of measurements with the two systems. ARGOS outperforms System B and their difference is particularly notable for cataracts with grade IV and above. For the whole data set (n = 143), ARGOS had an AL acquisition rate of 97.2% while System B recorded 94.4%. When only grade IV or higher cataracts were considered (n = 27), ARGOS maintained a success rate of 92.6% while that of System B dropped to 77.8%.

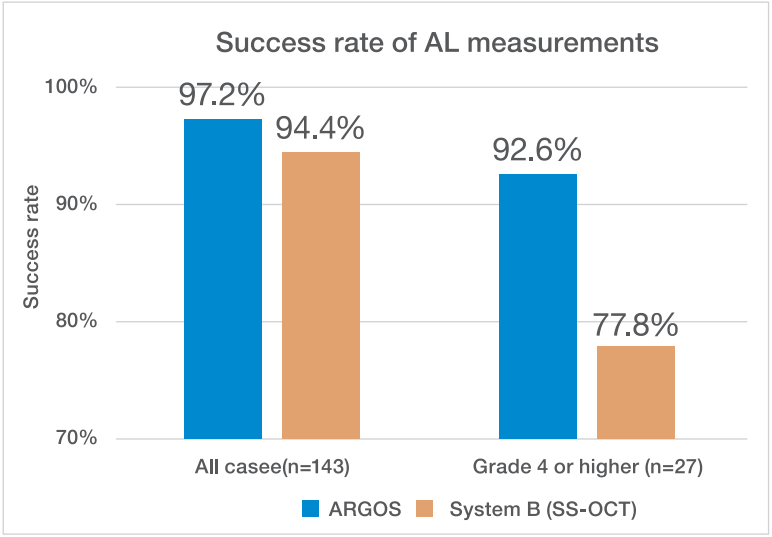

Figure 1. Success rate of measurement by ARGOS and System B

Figures 2 and 3 show examples of eyes where ARGOS successfully measured the AL but System B failed. In both cases, ARGOS was able to capture an image of the retina despite the presence of mature cataracts, demonstrating its ability to penetrate dense cataracts.

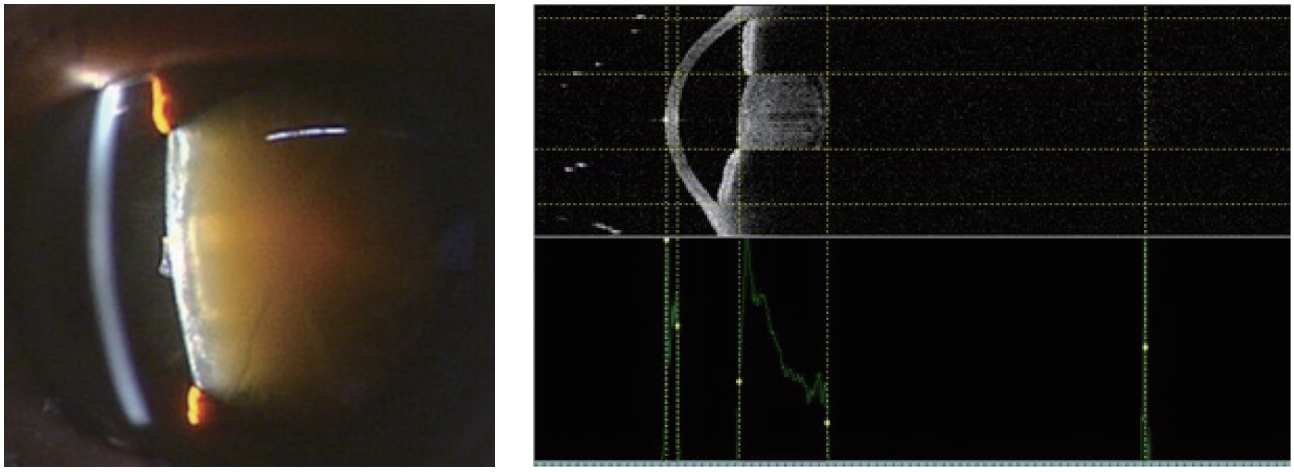

Figure 2. Slit lamp and ARGOS measurement of a mature cataract. ARGOS successfully measured AL of 22.47 mm.

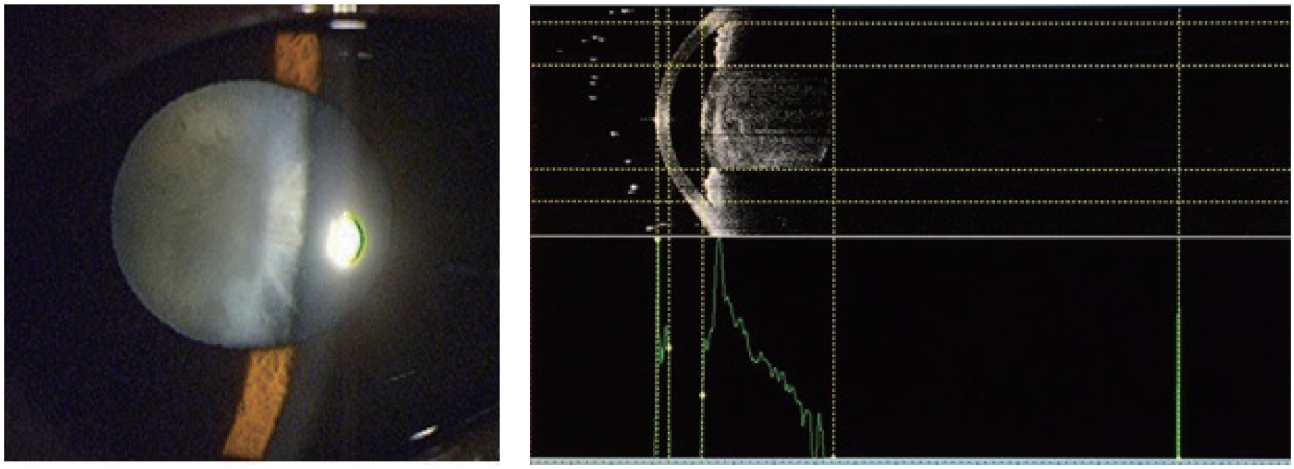

Figure 3. Slit lamp and ARGOS measurement of a white cataract. ARGOS successfully measured an AL of 24.91 mm. Postoperative measurements of AL showed good agreement with ARGOS measuring 24.88 mm and System B, 24.91 mm.

Conclusion

MOVU delivered a Swept-Source OCT biometer, ARGOS, with an in-house developed scanning laser optimized for fast and robust characterization of cataractous eyes with a deep (>50 mm) imaging range. It demonstrated superior performance in AL acquisition rates over other optical biometers. A higher success rate with non-contact biometry in the clinic reduces the frequency of the ultrasound measurements, leading to savings in time, improvements in accuracy, and maximized patients' comfort.

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