Ciliary Sulcus Microcysts as the Source of a White-to-White Sizing Mismatch With the Implantable Collamer Lens

The Visian Implantable Collamer Lens ([ICL] STAAR Surgical, Monrovia, CA) is a ciliary sulcus-placed posterior chamber intraocular lens used in the management of high myopia in phakic patients.1 Because of the risk of cataract, ICL vaulting greater than 250 µm is recommended to reduce rubbing of the ICL on the crystalline lens. However, excessive vaulting greater than 750 µm increases the risk of angle closure and pupillary block glaucoma.2 Based on U.S. Food and Drug Administration (FDA) studies, the recommended method for predicting the appropriate lens length and potential vault height is the white-to-white horizontal corneal diameter, which is best measured during biometric measurements. Alternatively, one could also directly measure the ciliary sulcus diameter with ultrasound biomicroscopy (UBM).3 Although white-to-white is the FDA-approved measurement, evidence suggests that it does not reliably correlate with the ciliary sulcus diameter. Consequently, sulcus-based diameter measurements with UBM sizing are superior in predicting the proper postoperative ICL vaulting.2,3

Whenever there is a poor correlation between white-to-white and sulcus-to-sulcus measurements, concern should be raised for an underlying mass lesion or measurement error. To illustrate this point, a 42-year-old woman diagnosed as having high myopia, white-to-white measurements of 12.2 mm, and sulcus-to-sulcus measurements of 10.39 mm in the right eye underwent ICL implantation of a 12.6-mm lens after failed insertion of a 13.2-mm lens. Persistent high vaulting of the ICL (1.5× to 2× corneal thickness) developed immediately postoperatively with narrowed but open angles. UBM showed multiple small (50 to 350 µm) cysts throughout the ciliary sulcus in all meridians (Figure 1). These microcysts were not detected prior to implantation, but only after careful segmental evaluation with the UBM. Because of the persistent ICL vaulting and angle narrowing, the ICL was explanted with no further surgical intervention planned.

Ciliary body cysts are a common and benign finding in UBM. Kunimatsu et al. found that 54.3% of normal patients had detectable cysts.4 They are usually congenital neuroepithelial lesions located at the iridociliary junction or the pars plicata.5 These cysts are almost impossible to detect with slit-lamp examination or gonioscopy, but can be more easily visualized with the UBM.6 There are a few features that make this case unique. First, due to their size, the microcysts were only found after the ICL implantation, and only after careful segmental evaluation with the UBM. Second, our case did not involve one single cyst in the ciliary body, but multiple microcysts in all quadrants of the ciliary sulcus. Previous research by Wang and Yao found that multiple cysts and multiple quadrant cysts have a significant effect on angle narrowing compared to a single cyst in phakic eyes.6 Therefore, despite the patient’s good visual acuity and normal intraocular pressure, explantation was performed. Third, the white-to-white and sulcus-to-sulcus measurements had considerable discrepancy (12.2 and 10.39 mm, respectively, in the right eye), and should have been a warning sign for the use of the white-to-white measurements in sizing the ICL in this patient. We believe the larger discrepancy in our patient was a feature of multiple cysts in all meridians.

There are two important points to be noted in regard to this case. First, using the FDA-approved and recommended white-to-white measurements in the ICL sizing of our patient led to a false overestimation of the required lens size. Second, ciliary sulcus
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Microcysts can be easily missed during the routine preoperative ICL work-up, and should be considered as a potential source of any large discrepancy between white-to-white and sulcus-to-sulcus measurements.

REFERENCES

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