Angle closure after Boston Keratoprosthesis
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To evaluate changes in the anterior chamber angle after Type I Boston keratoprosthesis (KPro) placement.

Institutional Review Board approval was obtained from the New York Eye and Ear Infirmary. Ten patients were prospectively enrolled. Enrollment criteria were defined as any patient approved for Boston-type I KPro surgery regardless of the patient’s pre-KPro glaucoma status.

All patients underwent placement of a Boston type I keratoprosthesis with an 8.5 mm PMMA backplate.

Imaging of the angle with anterior segment optical coherence tomography (AS-OCT) was performed on each patient preoperatively, and postoperatively at one, six, twelve, and eighteen months after KPro placement.

Images were obtained from the AS-OCT (anteriorm chamber-ocuT prototype; Ophthalmic Technologies, Toronto, Ontario, Canada). Due to software limitations, only horizontal scans were performed.

The three and nine o’clock positions were examined and compared across all time points. For each image, the scleral spur was identified and the angle was judged to be open or closed.

Subsequent scans were evaluated for the development and/or progression of synechial angle closure.

The mean follow-up was 22.5 ± 16.5 months. The patients’ preoperative diagnoses were Stevens-Johnson syndrome (SJS) (n=2), chemical injury (n=4), granular dystrophy (n=1), idiopathic uveitis (n=1), tertiary syphilis (n=1) and ocular amyloidosis (n=1).

Seven of ten eyes had open angles at the 3 and 9 o’clock positions preoperatively.

Three eyes demonstrated partial or complete angle closure preoperatively. Angle closure did not appear to progress in these patients.

Of the seven patients with open angles preoperatively, four developed angle closure postoperatively within 1 to 4 months (Patients 1, 2, 5, and 8). Scans at 6 months and 1 year confirmed progression of synechial angle closure in two of the four patients (Patients 5 and 8). Of the four patients that developed angle closure, three of the four had pre-existing glaucoma and had already undergone glaucoma drainage device (GDD) placement. The remaining patient, who was not known to have glaucoma preoperatively, is awaiting the placement of a GDD after having failed medical therapy (Patient 5). Figure 1 demonstrates the changes in this patient’s angle.

Of the seven eyes with open-angles prior to KPro, three remained open postoperatively with mean follow-up of 22.7 ± 20.1 months. None had a prior diagnosis of glaucoma (Patients 3, 6, and 10). Figure 2 demonstrates a patient from this group whose angle remained open on all follow-up scans.

A finding common to three of the four patients who developed angle closure was contact between the backplate and the iris. This is shown in Figure 3. A fourth patient’s iris was noted to be touching the backplate but this patient was also observed to have partial angle closure on preoperative imaging. This patient did not show further angle closure on subsequent scans.

The prevalence of glaucoma in patients undergoing keratoprosthesis placement is estimated to range from 36-76%. In this series, four patients had pre-existing glaucoma. All four required a GDD prior to KPro surgery.

The de novo development of glaucoma following KPro insertion is a well-established but poorly understood complication of the procedure. River et al studied 7 eyes without a pre-existing diagnosis of glaucoma and reported that all developed glaucoma after KPro placement. Other studies have shown that glaucoma develops in 2-26% of KPro recipients.

De novo glaucoma was seen in two of the ten patients in our study.

The 8.5mm KPro backplate is recommended for use in adults. It is thought that the larger backplate size clamps the graft wound and prevents the formation of retro-prosthetic membranes. Four of the ten patients in this study developed adhesions between the iris and the backplate. Given this finding, there may be a role for partial or even complete iridectomy at the time of KPro surgery.

Adhesion formation between the iris and the backplate should be studied after implantation of the thinner titanium or smaller 7.0mm backplates.

ADMISSIONS of the iris to the backplate may play a significant role in the development of glaucoma after KPro placement. Imaging of angle structures with horizontal, vertical, and oblique scans may provide valuable information with which to guide standard surgical technique and the postoperative management of Boston KPro patients.

REFERENCES