Evaluation of Posterior Capsular Opacification in Three Types of Hydrophobic Acrylic Intraocular Lenses

HOYA has recently launched a new model of intraocular lens (IOL), the NY-60. With PMMA tip haptics and a sharper edge than a preceding model, the PY-60AD, the NY-60 adds a new option for IOL selection. In this study, postoperative posterior capsular opacification (PCO) with these IOLs was evaluated and compared with the Alcon SN60WF IOL as a control.

The development of a secondary cataract on IOLs of different edge geometries and materials was evaluated by transillumination images obtained with an anterior segment analyzer (EAS-1000, NIDEK) using Scion Image image analysis software. It is confirmed that results of this analysis are comparable with results obtained by assessment with POCOman system software.(1)

Subjects
Patients who underwent microincision cataract surgeries at Yoshida Eye Hospital and who were available for follow-up for at least six months were included in this study.

NY-60 (HOYA) 48 eyes of 28 patients (mean age 70.3 years)
SN60WF (Alcon) 49 eyes of 28 patients (mean age 71.0 years)
PY-60AD (HOYA) 48 eyes of 27 patients (mean age 70.7 years)

Methods
Using the EAS-1000 anterior segment analyzer, baseline postoperative PCO values and the PCO increase rates were determined by two methods: transillumination (with Scion Image image analysis) and slit-lamp examination. These methods are described in detail below. The results were tested by multiple comparisons.

PCO evaluation with Scion Image software
An image of the anterior segment of each eye was obtained with the transillumination mode of the EAS-1000. The examiner specified a circle 4mm in diameter within the pupil, enlarged the circular image, and selected five opacity-free spots (Figure 2). After adjusting contrasts of the five images, black portions were considered to represent postoperative PCO. The number of pixels in the black portions was counted to determine PCO values.

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Figure 1. Edge geometries of three types of IOLs

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<th>NY-60</th>
<th>SN60WF</th>
<th>PY-60AD</th>
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Figure 2. PCO analysis in transillumination images with Scion Image software

A 4mm diameter circle is specified in the center of the pupil. The circular image is enlarged. Five opacity-free spots are arbitrarily selected. The number of black pixels (PCO) in the five spots is counted.
PCO evaluation with slit-lamp technique

Slit-lamp images of the anterior eye segment were obtained from four directions: 0, 45, 90, and 135 degrees. The PCO value (CCT) was determined by axial densitometry.

Results: PCO values and increase rates on different IOL types

Figure 4 shows the PCO values determined by transillumination with Scion Image image analysis for the NY-60 (HOYA), SN60WF (Alcon), and PY-60AD (HOYA) IOLs at one week and two, three, and six months postoperatively. The vertical axis represents the PCO value (number of black pixels), and the horizontal axis represents the time points of one week and one, three, and six months. There were significant differences noted between the NY-60 and PY-60AD at all time points (P < 0.01). The NY-60 also had smaller PCO values than the SN60WF, but these differences were not significant. These findings suggest that the sharper edge of the NY-60 versus the PY-60AD is able to suppress PCO during the first six months after cataract surgery.

The results of this study demonstrate that improvements in the edge geometry can contribute to a reduction in the incidence of PCO. Further suppression of PCO by continuous improvements in IOL technology remains a top priority. A means of such improvement would be to sharpen the edges of the haptics of single-piece IOLs. However, some research has shown that the positive effects of a sharper IOL edge do not last for more than about five years. Thus, continued development of new IOL materials is also important.

References


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