

Case Report

To avoid post-operative refractive error in cataract surgery

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Abstract

One of the greatest issues facing the cataract surgeon today is accurate prediction of post-operative refractive error. With use of intraoperative autorefractometry (IOAR), such errors can be detected and post-operative refractive errors avoided. An 83-year-old woman was admitted for right eye phacoemulsification, with aimed at -1.78D with Sanders/Retzlaff/Kraff/T (SRK/T) formula implantation under local anesthesia. IOAR was performed after IOL insertion. The first estimate was $+1.1\text{D}$, indicating hyperopia, and far from the desired refraction above 2D . IOL exchange to $+11.5\text{D}$ was, therefore, performed. The second estimate was -0.13D and the operation was completed. The final refraction (3 years after operation) was -0.25D . With IOAR, we were able to avoid the unpleasant surprise of a mistaken intraocular lens power. Intraoperative autorefractometry is useful for avoiding errors in IOL power.

Keywords: Intraoperative autorefraction, Cataract, Intraocular lens, Errors, Refractive error

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Introduction

One of the greatest issues facing the cataract surgeon today is accurate prediction of post-operative refractive error. Among the many variables that determine final refractive outcome,⁴ significant ones include the biometric parameters, including axial length, keratometry and anterior chamber depth, and errors, including intraocular lens (IOL) mislabeling,⁶ insertion of an IOL with incorrect power, and IOL insertion in the wrong patient. Preoperatively, not all of these can be avoided. Intraoperative autorefractometry (IOAR) is an alternative method to calculate IOL power without axial length and corneal curvature.^{5,3,1} With use of IOAR; such errors can be detected and post-operative refractive errors avoided.

Case report

An 83-year-old woman was admitted for left eye phacoemulsification with polymethyl methacrylate (PMMA) intraocular lens (IOL) $+14.0\text{D}$ (UVCY-1P, Hoya, Japan) aimed at -1.45D with Sanders/Retzlaff/Kraff/T (SRK/T) formula implantation under local anesthesia. Axial lengths measured with A-scan biometry (AL-3000, Tomey, Japan) were 27.4 mm (right eye) and 25.8 mm (left eye). Keratometry with an autokeratometer (RK-2, Canon, Japan) yielded 44.6D (right eye) and 43.8D (left eye). The final refraction was -0.75D with a PMMA IOL (UVCY-1P; Hoya, Japan) $+14.0\text{D}$. When axial lengths were measured again after left eye operation, they were 27.6 mm (right eye) and 25.5 mm (left eye).

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The woman was then admitted for right eye phacoemulsification with PMMA IOL + 10.0D (UVCY-1P, Hoya, Japan) aimed at -1.78D with SRK/T formula implantation under local anesthesia. IOAR was performed after IOL insertion with a handheld autorefractometer (Retinomax K-plus2; Nikon, Japan). The first estimate was $+1.1\text{D}$, indicating hyperopia, and was far from the desired refraction above 2D . IOL exchange to $+11.5\text{D}$ (aiming at -2.82D with SRK/T formula) was, therefore, performed. The second estimate was -0.13D and the operation was completed.

The final refraction (3 years after operation) was -0.25D .

Discussion

IOAR is performed to improve the accuracy of post-operative refraction prediction, and results show that its accuracy is equal to that of conventional calculations.³ However, it is not something that would replace conventional biometric measurements and IOL calculations.

The indications for IOL exchange, such as pseudophakic bullous keratopathy, cystoid macular edema, and chronic inflammation, have decreased remarkably. Incorrect IOL power has now become one of the most frequent causes of IOL exchange. It is impossible to completely prevent human error. Instances such as where people mistake 12.5D for 21.5D ² do occur. Furthermore, even if we are able to measure biometry perfectly before operation, errors such as

IOL mislabeling cannot be avoided. However, IOAR can be used to detect human error and IOL mislabeling.

With IOAR, we were able to avoid the unpleasant surprise of a mistaken intraocular lens power. When axial lengths were measured with beam biometry (IOL Master; Zeiss, Germany) after operation, they were 26.28 mm (right eye) and 25.49 mm (left eye). In this case, the error was due to a mistake in axial length measurement. Intraoperative autorefractometry is useful for avoiding errors in IOL power.

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