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Original Article

Decreased visual acuity resulting from glistening and sub-surface nano-glistening formation in intraocular lenses: A retrospective analysis of 5 cases

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Abstract

Background: To report on five patients with decreased visual acuity due to glistening and severe sub-surface nano-glistening (SSNG) formation within their intraocular lenses (IOLs).
Design: Case reports and analysis of extracted IOLs.
Participants and samples: We report improved visual acuity when IOLs with severe glistening and SSNG were exchanged for clear IOLs in five patients.
Methods: Case reports.
Main outcome measures: The main outcome measure was visual acuity. The secondary outcome measure was light transmission. Explanted IOLs were subjected to investigation. Pre- and postoperative slit lamp images of the anterior eye and microscopic images of the extracted IOLs were taken and compared. Light transmission of the IOL was measured using a double beam type spectrophotometer. An integrated value of the percentage light transmittance in the visible light spectrum was calculated.
Results: We report on five patients whose visual acuity improved when IOLs were exchanged because of severe glistening and SSNG. All of the affected IOLs were MA60BM (Alcon, Forth Wroth Texas, USA) and the original implantation had occurred over a range of 6–15 years prior to the IOL exchange. Light transmission was decreased in all affected lenses compared to a similar control IOL.
Conclusions: Although only a few reports of cases in which glistening and SSNG have progressed to the level of decreased visual function have been published, the likelihood is that this phenomena will increase as the severity and incidence of these inclusions have been shown to increase with time. Appropriate evaluations of visual function in such patients are needed and consideration should be given to IOL exchange in symptomatic patients.

Keywords: Glistening, Sub-surface nano-glistening, Whitening, Hydrophobic acrylic IOL, Microvacuole

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Light transmittance studies were performed on explanted IOLs.

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Introduction

Visual function in ophthalmology can be assessed using a number of methods, including Snellen acuity, contrast sensitivity, disability glare testing, visual field analysis, accommodative amplitude, and reading speed. However, the most commonly used simple method of assessing visual outcome in intraocular surgery is still visual acuity. Causes of decreased visual function due to IOLs, confirmed both in vivo and in vitro, are glistenings[1–3] and whitening.[4] The former term is given to fluid-filled microvacuoles within the IOL optic which appear to ''glisten'' as light passes through them. The latter refers to the clinical appearance from subsurface nanoglistenings (SSNG) of reflected white light due to light scattering as light encounters nanosized fluid filled vacuoles that occur at the anterior and posterior IOL surface. Whitening is widely recognized and reported in Japan.[4,5]

Considerable controversy exits regarding the extent of impact on visual function due to glistening and SSNG. The majority of papers in the literature have reported that these changes did not influence the visual function.[6–8] However, there are also reports that argue that glistenings and SSNG have led to such significant symptoms and/or visual function deterioration in selected cases which necessitated IOL explantation and replacement.[9–11]

In this paper, we report improved visual acuity when IOLs with severe glistening and SSNG were exchanged for clear IOLs in five patients.

Methods

A retrospective chart review was undertaken to identify patients who had undergone prior IOL exchange for visually significant glistenings and SSNGs. The study adhered to the Tenets of the Declaration of Helsinki. Each subject was asked to provide informed consent before undergoing the IOL exchange procedure. Ethics Review Board approval for this retrospective study was obtained from the Bioethics Committee of Dokkyo Medical University in Japan.

Explanted IOLs were subjected to investigation. Care was taken to explant the IOL with the optic intact so as to allow for measurement of light transmission. Only cases with intact optics were included in this review. Pre- and postoperative slit lamp images of the anterior eye and microscopic images of the extracted IOLs were taken and compared (Fig. 1; upper row is of preoperative photos, middle row is of postoperative photos, and lower row is of the explanted IOL). The extracted IOLs were immediately placed in physiological saline at 33 °C to avoid any change in the severity of glistening and whitening.[12] Any lens capsule and tissue attached to the extracted IOL were removed while it was submerged in physiological saline at 33 °C, and the IOL surface was examined under light microscopy (F23PL20WK; Optron, Kanagawa, Japan). Next, using a double beam type

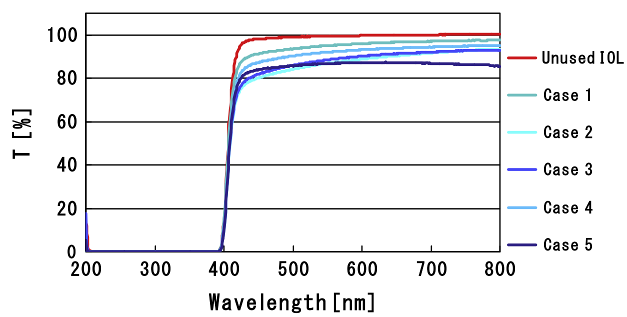

Figure 2. Light transmittance of extracted IOLs. Light transmittance is shown for Cases 1–5. Compared with light transmittance through an unused +20.0D IOL, light transmittance is decreased in the extracted IOLs.

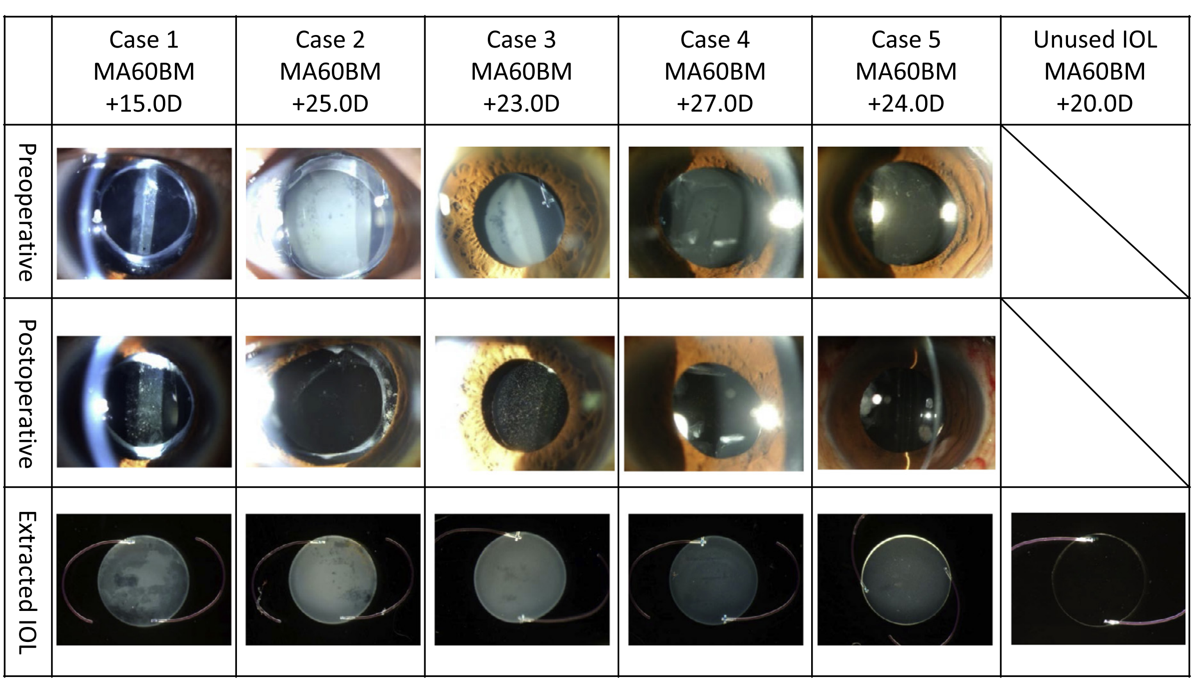

Figure 1. Anterior segment images before and after IOL replacement and the extracted IOLs. The upper row shows anterior eye photographs before IOL extraction. The middle row shows photographs of the anterior segment after IOL extraction. The bottom row shows optical microscope images of the extracted IOLs with the lens capsule and other tissue removed.