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# Refractive changes following Nd:YAG capsulotomy

#### Abstract

**Purpose** To investigate the effect of Nd:YAG capsulotomy on refractive changes and the need for a post-capsulotomy refraction. **Methods** Forty-two eyes with uncomplicated phacoemulsification and implant (AMO@Phacoflex II) were included. Autorefraction and subjective refraction were performed to get the best visual acuity before and after Nd:YAG capsulotomy. **Results** The spherical equivalent before the Nd:YAG capsulotomy was  $-0.61 \pm 0.90$  and after the capsulotomy,  $-0.57 \pm 0.84$ . Using the paired Student's *t*-test there was no significant difference in the refraction following Nd:YAG

capsulotomy. Conclusion Routine refraction following Nd:YAG capsulotomy in patients who have had uncomplicated phacoemulsification using AMO@Phacoflex II intraocular lenses is not necessary.

Key words Cataract, Capsulotomy, Refraction

Posterior capsular opacification is a common cause of reduced visual acuity following otherwise successful extracapsular cataract extraction and implant.<sup>1,2</sup> Laser capsulotomy using Nd:YAG laser is the recommended treatment; this causes photodisruption of the capsule and thus clears the visual axis.<sup>3</sup> One of the complications of this procedure is a shift in the position of the implant.<sup>4,5</sup> This causes a change in the effective power of the lens in the eye and potentially alters the refraction of the patient. Any significant changes in refraction may be inconvenient for the patient as a further refraction may be required to ensure optimal vision, and new spectacles if there is a significant change. In addition, the requirement to re-refract following Nd:YAG capsulotomy would lead to an increase in the workload in eye units.

# Patients and methods

Forty-two eyes in 42 patients who presented for Nd:YAG capsulotomy were included in the study. The entry criteria were previous routine phacoemulsification with in-the-bag intraocular lens placement and the presence of visually significant posterior capsular opacification. In all cases the implant used was an AMO@Phacoflex II (three-piece posterior chamber biconvex silicone optic with ultraviolet absorber and blue PMMA haptics). The mean patient age was 75 years (range 50–80 years). The average time from cataract surgery to the laser procedure was 24 months (range 9–36 months).

To determine whether capsulotomy changes the refraction, the patients underwent autorefraction (Humphrey autorefractor) followed by subjective refraction prior to the laser. Best corrected visual acuity was recorded. The capsulotomy was performed by a single surgeon with Nd:YAG (Q-Schwind) and a standard Abraham capsulotomy lens. The capsulotomy was fashioned in a cross pattern to create a 3 mm diameter opening. Four weeks after laser treatment, autorefraction followed by subjective refraction were repeated and the best visual acuity was again recorded. The results of the refraction were expressed as the spherical equivalent in dioptres. Comparisons of the preand post-laser spherical equivalents were made with paired Student's t-tests.

#### Results

Thirty-eight patients showed visual improvement to 6/9 or better. Six patients did not show visual improvement. Of these, 5 had age-related macular degeneration and 1 had diabetic maculopathy. The mean spherical equivalent before capsulotomy was  $-0.61 \pm 0.90$  and after capsulotomy was  $-0.57 \pm 0.84$ . The change in the spherical equivalent was statistically insignificant (p = 0.14) (Fig. 1).

# Discussion

Studies of the position of the implant following Nd:YAG capsulotomy have shown a tendency for a shift in the position of the lens.<sup>4,5</sup> In patients who have a PMMA intraocular lens, the tendency is for a backward movement and therefore a hyperopic shift.<sup>5</sup> The magnitude of the shift is a function of the intraocular lens style and capsulotomy size. Shift of the lens is more pronounced with plate-haptic implants

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number of patients

Fig. 1. Refractive change following capsulotomy

than with one-piece PMMA and three-piece foldable implants.<sup>5</sup> A bigger capsulotomy is also found to be associated with increased backward movement.<sup>5</sup> Although there are reports of lens dislocation following Nd:YAG capsulotomy leading to a significant change in the refraction,<sup>6–8</sup> this complication is uncommon. None of our patients show significant changes in the refraction following capsulotomy.

Nd:YAG capsulotomy creates a clearer visual axis and therefore should improve the accuracy of the objective and subjective refraction. However, our study shows no significant change in refraction before and after the procedure despite the clearing of the visual axis and potential posterior movement of the lens. Thus, patients do not need post-capsulotomy refraction to ensure optimal visual outcome.

# Conclusion

In conclusion, our study shows that routine refraction following Nd:YAG capsulotomy in patients who have had uncomplicated phacoemulsification using AMO@Phacoflex II intraocular lenses is not necessary.

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