Resolution of negative dysphotopsia after laser anterior capsulotomy

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It has been suggested that a clear anterior nasal capsule contributes to negative dysphotopsia and that symptoms may resolve with opacification of the capsule. We describe a case in which negative dysphotopsia occurred despite a translucent anterior peripheral capsule and resolved following laser removal of the anterior nasal capsule.

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CASE REPORT

A 70-year-old man had phacoemulsification with in-the-bag implantation of an 18.0 SE/+2.0 diopter (D) toric 1-piece plate–haptic silicone IOL (AA4203TL, Staar Surgical Co.) in the right eye in January 2012. Three weeks after the procedure, the corrected distance visual acuity (CDVA) was 20/25 with a correction of −1.50 + 2.00 × 160. However, the patient complained of a dark shadow crescent in his temporal vision. The anterior and posterior peripheral capsules were clear on examination.

Eight weeks later, the patient continued to be bothered by the shadow in his vision. He also complained of a film over his eye and blurry vision, although the CDVA was 20/20. He demonstrated anterior capsule fibrosis and mild posterior capsule opacification. Some nasal decentration of the IOL was also present, but no tilt was seen on slitlamp examination. Figure 1 shows the opacity of the peripheral anterior capsule. Despite this translucency, the patient demonstrated symptoms of negative dysphotopsia.

Neodymium:YAG laser capsulotomy was performed to remove only the anterior nasal capsule, leaving the temporal capsule intact. The patient was treated with 250 mJ. His visual symptoms resolved immediately. Figure 2 shows the improved clarity after laser capsulotomy. The patient’s vision was 20/20 at the last examination. The patient was satisfied with the result of his procedure and continued to be asymptomatic.

There has been much uncertainty as to the causes of negative dysphotopsia. Several mechanisms have been suggested, including truncated optic edges,\(^1,2\) high index of refraction of the intraocular lens (IOL),\(^1,3\) transparency of the peripheral nasal capsule,\(^1,4\) and many others.\(^4-8\)

Recently, 2 prominent theories to explain the cause of negative dysphotopsia and the efficacy of surgical treatments have been proposed. In 2011, Masket and Fram\(^5\) concluded that “negative dysphotopsia is likely induced at the interface of the anterior capsulotomy and the front surface of the PC IOL, suggesting that a reflection of the anterior capsulotomy edge is projected onto the nasal peripheral retina.” This was evidenced by the finding that reverse optic capture or placing a piggyback IOL in the ciliary sulcus eliminated negative dysphotopsia but exchanging IOL material or design did not. Masket and Fram suggest that coverage of the anterior capsulotomy edge by the IOL eliminates the reflection, thus eliminating the negative dysphotopsia.

Holladay et al.\(^1\) argued that negative dysphotopsia occurs when light rays passing through the peripheral edge of the IOL are refracted posterior to those passing through the posterior surface, creating a shadow between them. They suggest that interventions that increase light scatter potentially eliminate the shadow. In-the-bag IOL exchange with a round- or frosted-edged or silicone IOL and reverse optic capture may be effective. However, in direct opposition to Masket and Fram,\(^5\) they argued that “[t]he opacification of the nasal capsule is the explanation for the efficacy of reverse optic capture.” A clear capsule has no effect on light rays, but a translucent nasal capsule scatters light, eliminating negative dysphotopsia.

We present a case in which complaints of negative dysphotopsia occurred despite a translucent peripheral anterior capsule and resolved with neodymium:YAG (Nd:YAG) laser removal of the nasal portion of the anterior capsule.

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and posterior capsules intact. The temporal shadow resolved. A photograph (Figure 2) taken 3 weeks later shows the missing anterior nasal capsule. The CDVA was 20/20; however, the patient continued to complain of blurry filmy vision. Nine weeks later, a second Nd:YAG laser anterior capsulotomy was performed temporally. This successfully relieved the filmy vision, thought to be due to temporal anterior capsule fibrosis involving the pupillary axis.

At the last follow-up in December 2012, the patient had no further complaints of negative dysphotopsia. The refraction in the right eye was −2.25 +2.75 × 172. Of note, the patient was also pseudophakic in the left eye. There were no complaints of dysphotopsia, capsule contraction, or residual astigmatism in that eye.

DISCUSSION

Holladay et al. believe that a translucent nasal capsule could scatter light rays and eliminate the shadow. However, this case demonstrates that negative dysphotopsia is not necessarily eliminated by opacification of the peripheral capsule. Our patient continued to be symptomatic despite opacity of the anterior nasal capsule; the symptoms were relieved after the anterior nasal capsule was removed with the Nd:YAG laser.

Our findings, in agreement with those of Masket and Fram, are that negative dysphotopsia is likely due to the anterior capsulotomy edge causing a reflection on the nasal retina. However, our case has limitations. Whereas classic negative dysphotopsia arises immediately after IOL implantation, our patient did not complain of negative dysphotopsia until 3 weeks after phacoemulsification. Additionally, there was a sizeable capsule contraction. The patient continued to have residual astigmatism postoperatively, which can be explained by rotation of the toric IOL. It was originally placed at 15 degrees but rotated to its current position of 78 degrees, presumably as the capsule contracted. The current keratometric astigmatism in the right eye is 1.13 @ 173. Assuming a cylinder power of −1.30 × 78 at the corneal plane for this 2.0 D toric IOL, the predicted postoperative refraction can be calculated by adding these 2 astigmatic vectors to be +2.42 × 170, close to his refractive astigmatism of +2.75 × 172. All of the negative dysphotopsia and most of the blurred filmy vision were relieved by the 2 capsulotomies. We suspect the residual slight blur in this eye is because of residual astigmatism or because the IOL is slightly decentered nasally.

While this article was in the review process, Holladay clarified his position, stating that “[o]pacification of the anterior capsule overlying the IOL would not affect the type 3 shadow because the light rays would undergo Lambertian scatter and be reflected or refracted and then pass through the front surface of the IOL, creating an alternative path for incident light to reach the truncated sharp posterior nasal edge of the IOL, creating or enhancing the type 3 shadow. In fact, it is possible that this may be the only path and removing a sector of opacified nasal anterior capsule overlying the IOL might eliminate the negative dysphotopsia by removing this path of scattered light.” Potentially, Holladay’s comments would apply to our patient’s situation, although it is important to note that our patient’s IOL did not have a truncated sharp posterior edge. Holladay discusses this further in the consultation section in this issue.

Perhaps other cases of negative dysphotopsia can be resolved with Nd:YAG laser removal of the nasal anterior capsule rather than with intraocular manipulation. More research is needed to fully elucidate the causes of negative dysphotopsia and the efficacy of treatments.

REFERENCES


