Straylight in anterior segment disorders of the eye

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Chapter 9

ALLEVIATING DEBILITATING PHOTOPHOBIA AND SECONDARY EXOTROPIA CAUSED BY INCREASED STRAYLIGHT BY WIDENING A SMALL POSTERIOR CAPSULOTOMY

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ABSTRACT

In a patient with complaints of photophobia and an ocular deviation, straylight was found to be increased to 1.61 (log\[s\]), which is 5 times the normal value. The only relative clinical finding was the edge of a too small posterior capsulotomy. Visual acuity was normal. Six weeks after the posterior capsulotomy was widened to a diameter of 6.0 mm with a neodymium:YAG laser, the symptoms were resolved and the patient was satisfied. Straylight may manifest clinically as complaints of photophobia. Straylight increase, which can be related to slitlamp findings, may lead to an interventional decision. Our clinical decision-making was also guided by straylight measurements and proved to be crucial in resolving the patient’s complaints. More study of clinical situations in which straylight measurement can be used is needed.
Photophobia, abnormal sensitivity or intolerance to light, is a complaint that accompanies many ocular diseases. The complaint can sometimes be translated as disability glare. Disability glare is typically encountered when optical imperfections of the eye cause the light in the eye to be scattered, causing a veil of bright light in the sight, and may be reported by the patient as photophobia.\(^1\) Disability glare is the reduction in visual performance caused by a glare source, which causes retinal contrast degradation secondary to intraocular straylight.\(^2,3\)

The Commission Internationale de L’Eclairage (CIE) defines straylight as disability glare. The C-Quant straylight meter (Oculus Optikgeraete GmbH) measures straylight in the eye and provides information about the optical imperfections as the cause for disability glare. The instrument determines straylight according to the internationally accepted definition (CIE).\(^1\) The amount of straylight is expressed as the straylight parameter normally given as its logarithm, \(\log(s)\) (compare logMAR).\(^4\) In young eyes, the mean \(\log(s)\) is 0.94.\(^1\) The normal straylight values change with age. A doubling occurs at age 65, corresponding to a logarithmic increase of 0.3 (\(\log(s)\) 1.24).

The straylight measurement is a forced-choice test in which the patient is offered a central light surrounded by a flickering glare source that increasingly extinguishes the central light. The test results are graphically displayed on the monitor and simultaneously placed within the population graph, allowing assessment of the patient’s straylight related to his or her age. The straylight has internal quality parameters, such as the estimated standard deviation, which allow monitoring of the quality of the measurements. The theory and practice of the technique have been described.\(^1,2,4\)

Straylight is caused by structures within the eye. In the normal young eye, the cornea, the lens, and the rest of the eye each contribute a third to straylight. Straylight increases with age, primarily because of cataract.\(^4\) After uneventful cataract surgery, straylight should decrease unless other ocular structures, such as the capsular bag, the edge of the capsulorhexis, anterior capsular fibrosis, and posterior capsule opacification (PCO), contribute to straylight. We have reported that the capsulorhexis size and density are related directly to straylight.\(^5\) In this report, we show that increased straylight may lead to an interventional decision, such as increasing the posterior capsulotomy, with the expectation that straylight will decrease and patient complaints will be alleviated.

**CASE REPORT**

A 77-year-old patient complained of photophobia and a new squint in a pseudophakic eye. The patient’s ophthalmic history included a buckling procedure for retinal detachments in both eyes in the 1990s, cataract surgery with implantation of a monofocal acrylic foldable intraocular lens in...
the bag in the right eye in 2002, followed by a neodymium:YAG (Nd:YAG) capsulotomy for PCO in 2005.

Since the Nd:YAG capsulotomy, the patient had noticed increasing photophobia in the right eye and intermittent exophoria of that eye, which slowly developed into a constant deviation. The uncorrected distance visual acuity was logMAR 0.20 (decimal 0.63) and the corrected distance visual acuity, logMAR 0.04 (decimal 1.0), with a refraction of 0.50 0.50 × 180. Findings in the examination of the right eye were pseudophakia with a small (2.0 mm) capsulotomy with dense borders and Elschnig pearls. The edges of the Nd:YAG capsulotomy were visible with an undilated pupil, but the capsulorhexis was not. The vitreous was clear, and the retina was scarred with a buckle in place. A small epiretinal membrane was visible in the macula. No other abnormality or reason for photophobia was found. Straylight measurements showed a log(s) increase to 1.61, corresponding to straylight intensity 5 times the young normal value.

The capsulotomy was widened to a diameter of 6.0 mm with an Nd:YAG laser. Six weeks after the capsulotomy, the patient commented that the effect was “miraculous.” Visual acuity was unchanged. Straylight had decreased to log (s) 1.01, which is less than the straylight in the best phakic 77-year-old eye. The deviation had returned to its intermittent character, and the patient was very pleased with the cosmetic result.

DISCUSSION
Complaints of photophobia can have many causes. In our patient, photophobia was caused by straylight secondary to a small posterior capsulotomy with edge opacities. The increase in straylight prompted the clinical decision to widen the Nd:YAG capsulotomy. This action alleviated the patient’s complaints. The improvement was substantiated by a decrease in straylight upon measuring.

Healthy young eyes have low straylight levels, with a mean of log(s) = 0.94. With age, straylight increases, which is attributed primarily to cataractous changes in the lens. Cataract surgery usually decreases straylight postoperatively. However, even in pseudophakic patients, we can see increased straylight. This is related to the capsulorhexis size and anterior and posterior capsule opacification. Posterior capsulotomies have been shown to decrease straylight.

Until now, straylight has been a laboratory technique that is slowly gaining clinical ground. In this case report, we show that the size of the capsulorhexis is important clinically in causing debilitating photophobia secondary to straylight. More important, the case is a good example of
Widening small posterior capsulotomy to alleviate symptoms of straylight

how straylight measurements may enhance our understanding of the patient’s complaints and may guide us in the treatment.

In conclusion, straylight secondary to posterior capsule changes may present itself clinically as photophobia and an ocular deviation. Clinical complaints and findings can be substantiated by measuring straylight before and after the procedure. More study of the clinical uses of straylight measurements are needed, but it appears that straylight measurements are slowly being implemented into clinical practice.
Chapter 9

REFERENCES


