

Journal Highlights

NEW FINDINGS FROM *OPHTHALMOLOGY*, *AJO*, AND *JAMA OPTHALMOLOGY*

Ophthalmology

Retinal Damage and Exposure to Handheld Blue Lasers

Ophthalmology

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Alsulaiman et al. found that even momentary exposure to a high-power, handheld blue laser can cause retinal damage and presents an extreme hazard to the eye. And although the visual acuity of eyes injured by these devices may improve spontaneously, most cases will require surgical intervention.

For this consecutive case series, the researchers evaluated 14 patients (14 eyes). All patients were young males, and all had a history of eye exposure to a 450-nm handheld blue laser device (power range, 150 to 1,200 mW). Most of the injuries occurred during play, and all occurred during a single calendar year.

The patients were evaluated with spectral-domain optical coherence tomography and fundus fluorescein angiography. Types of maculopathies included premacular subhyaloid hemorrhages in five eyes; full-thickness macular holes in four eyes; premacular sub-internal limiting membrane hemorrhages in two eyes; an outer retinal disruption at the fovea in one eye; an

epimacular membrane in one eye; and a schisis-like cavity in one eye. Mean best-corrected visual acuity (BCVA) at presentation was 20/290 (range, 20/40 to 4/200).

Four of the 14 eyes improved spontaneously with an increase in vision; the remainder required either laser hyaloidotomy or pars plana vitrectomy. Final mean BCVA was 20/35 (range, 20/15 to 20/300).

Because of the circumstances in which the injuries occurred, the researchers concluded that many young people are unaware of just how dangerous handheld lasers can be. Moreover, the sudden uptick in new cases

may well represent the early stages of an epidemic of ocular injuries unless the devices are more closely regulated.

Anterior Segment Changes During Acute PAC Attack

Ophthalmology

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What takes place during an acute primary angle-closure (APAC) attack? Sng et al. set out to evaluate the biometric parameters of the anterior segment during these episodes prior to the administration of laser peripheral iridotomy or medical treatment. They found that the two most

significant factors associated with APAC were a shallower anterior chamber depth and reduced iris curvature. However, these findings explained only about one-third of the variance in APAC occurrence.

For this prospective, comparative case series, the researchers used anterior segment optical coherence tomography to evaluate the affected and fellow eyes of 31 patients with unilateral APAC. Mean age was 60.9 ± 7.5 years, and patients were predominantly Chinese women. At presentation and before therapeutic interventions, the mean intraocular pressure was 53.8 ± 9.2 mmHg in the APAC eye and 14.2 ± 4.3 mmHg in the fellow eye. The anterior segment angle was closed in four quadrants in all APAC and fellow eyes, and during corneal indentation, the posterior trabecular meshwork was not visible in all APAC eyes.

In addition to measuring anterior chamber depth and iris curvature, the researchers measured anterior chamber area, anterior chamber volume, iris area, lens vault, trabecular iris space area, and iris thickness. They then used multivariate logistic regression modeling to determine the most important biometric variables associated with APAC compared with the fellow eye during the attack.

Shallower anterior chamber depth emerged as the most important anterior segment finding associated with APAC, accounting for almost 20 per-



cent of the variance in APAC occurrence. Smaller iris curvature accounted for 14.1 percent.

The researchers noted that these novel findings may be significant during the initiation of APAC, or they could be the consequence of acute increases in intraocular pressure. Ideally, future studies would evaluate other racial/ethnic groups and investigate the role of systemic and environmental factors as well.

Prevalence of Visual Problems by Race and Ethnicity in Preschoolers

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For the Vision in Preschoolers study, **Ying et al.** compared the prevalence of three visual disorders among preschool-aged children who participated in Head Start programs across the United States. They found that the prevalence of amblyopia and strabismus was similar among different racial and ethnic groups. By contrast, the prevalence of significant refractive errors varied by group, with the highest rate of hyperopia in non-Hispanic whites and the highest rates of astigmatism and anisometropia in Hispanics.

For this multicenter, cross-sectional study, the researchers evaluated 4,040 children aged 3 to 5 years. The children were drawn from five geographically disparate areas of the United States and five ethnic/racial groups (African-American, American Indian, Asian, Hispanic, and non-Hispanic white).

The overall prevalence of any vision disorder was 21.4 percent and ranged from 17.9 percent (American Indian) to 23.3 percent (Hispanic). The prevalence of amblyopia ranged from 3 percent (Asian) to 5.4 percent (non-Hispanic white), while the prevalence of strabismus ranged from 1 percent (Asian) to 4.6 percent (non-Hispanic white). With regard to refractive error, the highest prevalence of myopia was found in Asian children (1.93 percent) and the lowest in American Indian children (0.16 percent); however, this

difference was not statistically significant.

Greater differences emerged with regard to other refractive errors. The prevalence of hyperopia ranged from 5.47 (Asian) to 11.9 percent (non-Hispanic white); astigmatism rates ranged from 4.28 percent (American Indian) to 11.1 percent (Hispanic); and anisometropia ranged from 2.65 percent (Asian) to 7.13 percent (Hispanic).

The researchers noted that one strength of the study was the inclusion of American Indian children, a population that has not been evaluated in similar research.

In addition, the large sample size in each racial/ethnic group was robust enough to provide good statistical power. However, they noted that the low-income status of the Head Start families might have influenced some of the results, especially given that high rates of amblyopia, in particular, have previously been linked to low socioeconomic status.

American Journal of Ophthalmology

Cataract Surgery Improves Survival in the Elderly

January *AJO*

Fong et al. compared mortality and visual impairment among older cataract patients undergoing cataract surgery. They found that the correction of moderate to severe visual impairment in these patients was associated with a lower mortality risk, compared with patients whose visual impairment persisted postoperatively.

This cohort study included a total of 1,864 consecutive patients at least 64 years of age who underwent phacemulsification surgery. They were followed annually for five years postoperatively. Visual impairment status in the surgical eye was categorized as none (presenting visual acuity, at least 20/40), mild (less than 20/40 to 20/60), or moderate to severe (worse than 20/60). Of the 901 patients with moderate to severe visual impairment prior to surgery, 60.4 percent, 15.5 percent, and 24.1 percent had no, mild, or

moderate to severe visual impairment, respectively, in the surgical eye one month postoperatively.

After adjusting for age, sex, smoking status, body mass index, and individual comorbid conditions such as hypertension, diabetes, and myocardial infarction, patients with no visual impairment one month postoperatively had a 30 percent lower mortality risk over five years compared with patients whose moderate to severe visual impairment persisted. This finding was significant after additional adjustment for number of medications taken and number of comorbid conditions.

Night Vision Disturbances After Phakic IOL Implantation

January *AJO*

In this noncomparative study, **Lim et al.** investigated night vision disturbances after implantable collamer lens surgery and analyzed the risk factors associated with these disturbances. They found that, although not severe, the incidence of halos and glare after this type of phakic intraocular lens (IOL) implantation was not negligible.

The researchers reviewed the medical charts of 25 patients (50 eyes) who underwent collamer lens implantation. The incidence and severity of night vision disturbances were evaluated using questionnaires administered six months after surgery. Univariate simple and multiple logistic regression analyses were then used to detect risk factors associated with postoperative night vision disturbances.

The incidence of night vision disturbances was 34 percent for halos and 26 percent for glare. The researchers found that halos were significantly related to the collamer lens' optic zone diameter, the difference between the mesopic pupil size and this diameter, and the white-to-white diameter of the cornea. For glare, they identified toricity of the collamer lens as a significant risk factor.

The researchers concluded that the preoperative assessment of these predictive factors might make it pos-

sible to identify patients at high risk of experiencing night vision disturbances after phakic IOL implantation.

Parallelism as a Marker for Structural Integrity of Retinal Layers

January *AJO*

In this retrospective study, Uji et al. proposed a new parameter—parallelism—to evaluate retinal layer integrity. This parameter is assessed by the degree to which retinal layers are parallel to one another on spectral-domain optical coherence tomography (SD-OCT). The researchers also investigated the association between parallelism and visual function in eyes with idiopathic epiretinal membrane (ERM) and found that parallelism was significantly lower in eyes with ERM than in healthy eyes.

This study included 57 eyes of 57 patients with ERM and 30 healthy eyes of 30 volunteers in whom M-Charts testing and SD-OCT were performed on the same day. SD-OCT images were skeletonized, and the researchers applied the term *parallelism* to the orientation of segmented lines in the image. Parallelism was expressed as a value ranging from 0 to 1 and increased as the retinal layers ran more parallel with one another. The researchers then evaluated the relationships between parallelism and both visual acuity and metamorphopsia score.

In healthy eyes, parallelism was nearly homogeneous throughout, with only slight variations according to location. Parallelism values were significantly lower in eyes with ERM.

In horizontal and vertical SD-OCT scans of eyes with ERM, the researchers found that parallelism was significantly correlated with visual acuity and horizontal and vertical metamorphopsia scores. They also noted a significant negative correlation between parallelism and retinal thickness in horizontal and vertical scans of these eyes.

They concluded that parallelism has potential as a robust and practical method for assessing the structural integrity of retinal layers.

A Clinical Comparison of Bacterial, Fungal, and *Acanthamoeba* Keratitis

January *AJO*

Mascarenhas et al. determined the risk factors and clinical signs that may differentiate *Acanthamoeba* keratitis from bacterial and fungal cases in patients presenting with presumed infectious keratitis. They found that an increased suspicion for *Acanthamoeba* keratitis may be warranted in younger patients with many weeks of symptoms.

The researchers examined the medical records of 95 patients with laboratory-proven bacterial keratitis, 103 patients with laboratory-proven fungal keratitis, and 93 patients with laboratory-proven *Acanthamoeba* keratitis. They then compared the risk factors and clinical features associated with the three types of organism using multinomial logistic regression.

For the entire patient population, 287 (99 percent) did not wear contact lenses. Differentiating features were more common for *Acanthamoeba* keratitis than for bacterial or fungal keratitis. Compared with cases of bacterial or fungal keratitis, patients with *Acanthamoeba* keratitis were more likely to be younger, to have a longer duration of symptoms, and to have a ring infiltrate or disease confined to the epithelium.

Although culture and smear of corneal scrapings remain the most important ways to diagnose infectious keratitis, the researchers concluded that the findings from this study may aid in early diagnosis before culture results are known or in settings where a microbiological laboratory is unavailable.

JAMA Ophthalmology

Readability Assessment of Online Ophthalmic Patient Information

December *JAMA Ophthalmology*

Multiple agencies have recommended that online patient-oriented literature be written at a fourth- to sixth-grade reading level

to assist understanding. However, the readability of these materials as they relate to ophthalmic diagnoses is largely unknown. Therefore, Edmunds et al. assessed the online literature specifically for ophthalmic conditions and found that readability scores were not within the recommended range, irrespective of the measure used.

The researchers analyzed the text of the top 10 patient-oriented websites for 16 different ophthalmic diagnoses and assessed readability, source of information (United Kingdom versus non-U.K. and not-for-profit versus commercial), and appropriateness for sight-impaired readers. Four validated readability formulas were used; correlation was assessed by Spearman's rank correlation coefficient.

None of the 160 Web pages had readability scores within published guidelines; 83 percent were characterized as possessing "difficult" readability. Not-for-profit Web pages appeared to be longer than commercial Web pages, while U.K.-based Web pages appeared to have slightly superior readability scores compared with those of non-U.K. sources. Of all the Web pages evaluated, only 34 percent included the ability to adjust text size to assist visually impaired readers.

Although readability is only one aspect of how well a patient-oriented Web page may be comprehended, the authors recommended the use of readability scoring as well as features that help maximize visibility when producing these resources in the future.

Differences in Vision Between Clinic and Home and the Effect of Lighting

December *JAMA Ophthalmology*

Patients often report greater visual difficulties at home than in the clinic. To investigate this issue, Bhorade et al. compared vision measured in these two environments and evaluated the possible factors associated with any differences. They found that, indeed, vision measured in the clinic is generally better than vision measured at home, mainly owing to poor home lighting.

This cross-sectional study included 126 patients with glaucoma and 49 without glaucoma, aged 55 to 90 years. Each patient underwent clinic and home visits; and at each visit, certified examiners measured binocular distance visual acuity (VA), near VA, contrast sensitivity, contrast sensitivity with glare, and lighting.

The mean scores for all vision tests were better in the clinic than at home for patients with and without glaucoma. For distance VA, 29 percent of glaucoma patients read two or more lines better in the clinic than at home,

and 39 percent with advanced glaucoma read three or more lines better. For the entire sample, 21 percent of participants had two or more lines better near VA in the clinic than at home, and 49 percent read two or more three-letter triplets better in the clinic when contrast sensitivity with glare was assessed.

Lighting appeared to be the factor most strongly associated with differences in vision between the clinic and home when testing for distance VA, near VA, and contrast sensitivity with glare. In addition, the researchers

found that home lighting was below recommendations in 85 percent or more of cases.

They expressed hope that these findings will initiate clinician-patient discussions to optimize home lighting and improve the vision of older adults in their homes.

Ophthalmology summaries are written by Jean Shaw and edited by Susan M. MacDonald, MD. American Journal of Ophthalmology summaries are edited by Thomas J. Liesegang, MD. JAMA Ophthalmology summaries are written by the lead authors.

ROUNDUP OF OTHER JOURNALS

Long-Term Progression and Complications of Chloroquine Retinopathy

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Kellner et al. evaluated the progression of morphological alterations in chloroquine (CQ) and hydroxychloroquine (HCQ) retinopathy after patients stopped taking the drugs. They found that severe CQ/HCQ retinopathy may continue to progress for at least seven years after treatment cessation. Moreover, the researchers found that this progression may be complicated by the development of cystoid macular edema and epiretinal membrane formation.

This study included 11 female patients who had been treated with CQ/HCQ between 2004 and 2011. At the time they stopped taking CQ/HCQ, the patients' mean age was 63 years (range, 46 to 78 years).

All of the patients had an autoimmune disease; none had any other retinal disorders, had used other medications known to affect the retina, or had any other ophthalmic disorders except for cataracts.

For this follow-up evaluation, the researchers conducted a clinical examination and screened the patients using spectral-domain optical coherence tomography, fundus autofluorescence (FAF), ultra-wide-angle autofluores-

cence (UW-FAF), and near-infrared autofluorescence (NIA).

Two patients, both of whom had limited parafoveal retinopathy, did not experience progression of their CQ/HCQ retinopathy. However, the remaining nine patients complained of progressive loss of visual function after they went off the drugs.

FAF, UW-FAF, and NIA changes included an increase in the size of the affected area or a regional increase or decrease in FAF or NIA intensity. Spectral-domain optical coherence tomography images included reduction of retinal thickness, an increased area of photoreceptor or retinal pigment epithelial loss, development of or increase in cystoid macular edema, and development of epiretinal membranes. Treatment of the cystoid macular edema, with either topical dorzolamide or systemic acetazolamide, was of limited benefit.

Intracameral Bevacizumab as Adjunct to Trabeculectomy

British Journal of Ophthalmology
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Vandewalle et al. investigated the impact of a single intracameral injection of bevacizumab on the outcome of primary trabeculectomy in patients with open-angle glaucoma. They found that this adjunctive use of

the anti-VEGF agent reduced the need for additional interventions during the follow-up period.

For this prospective, randomized, placebo-controlled trial, the researchers evaluated 138 patients, 69 of whom were randomized to receive an intracameral injection of bevacizumab. The rest received balanced salt solution during the operation. The researchers chose the intracameral route in part because it allowed for a diffuse distribution of the drug in the anterior chamber and throughout the outflow route into the filtration bleb without disturbing conjunctival integrity.

Patients were examined seven times following trabeculectomy: on day 1; at weeks 1, 2, and 4; and at months 3, 6, and 12. Although the intraocular pressure (IOP) was reduced in both groups at the 12-month visit, a smaller number of bevacizumab patients required follow-up needling procedures to achieve the required IOP reduction.

This study employed a dose of 25 mg/mL of bevacizumab; the researchers suggested that other dosing strategies should be investigated as well. Moreover, they noted that this study was not designed to investigate whether bevacizumab could replace or be used as an adjunct to mitomycin C.

Roundup of Other Journals is written by Jean Shaw and edited by Deepak P. Edward, MD.