

Journal Highlights



CONTENT
AVAILABLE

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

Ophthalmology

AR-13324 vs. Latanoprost for IOP

Ophthalmology

Published online Sept. 27, 2014

Bacharach et al. compared the safety and efficacy of two concentrations of AR-13324, a Rho kinase inhibitor, with that of latanoprost in patients with open-angle glaucoma or ocular hypertension. The researchers found that although the experimental medication did produce reductions in intraocular pressure (IOP), AR-13324 was less effective than latanoprost and more likely to be associated with the finding of ocular hyperemia.

This double-masked, randomized study was conducted in 22 private practice ophthalmology clinics. All told, 213 patients completed the 28-day study, with 71 patients in the AR-13324 0.01 percent cohort, 68 patients in the AR-13324 0.02 percent cohort, and 74 patients in the latanoprost group.

Although the 0.02 percent solution of AR-13324 was more effective than the 0.01 percent solution at reducing IOP, it proved less effective than latanoprost. At day 28, mean IOPs were 20.1 mmHg in the AR-13324

0.01 percent cohort, 20.0 mmHg in the 0.02 percent cohort, and 18.7 mmHg in the latanoprost group—representing a decrease from baseline of 5.5, 5.7, and 6.8 mmHg, respectively.

The most frequently observed adverse effect of AR-13324 was conjunctival/ocular hyperemia, which affected more than one-half of those treated. No drug-related systemic safety issues were noted.

Part-Time Patching or Observation for Intermittent Exotropia

Ophthalmology

Published online Sept. 15, 2014

Cotter et al. investigated the effectiveness of part-time patching for treatment of intermittent exotropia (IXT) in children. They found that children who underwent three hours of daily patching experienced less deterioration of IXT than those who were simply observed, although the overall rates of deterioration were low in both groups.

For this six-month trial, 358 children between the ages of 3 and 10 who had previously untreated IXT were randomly assigned to either observation or patching for three hours per day for five months. This was followed by a one-month washout period of no patching before an examination at the six-month mark. Deterioration was

defined as the following: 1) constant exotropia of at least 10 prism diopters at distance and near as measured by simultaneous prism and cover test and/or 2) near stereoacuity that decreased by at least two octaves from baseline.

All told, 324 patients completed the study. Of the 165 in the observation group, 10 (6.1 percent) had experienced some deterioration compared with one (0.6 percent) of the 159 in the patching group. The researchers concluded that, given the low rate of deterioration, either approach is a valid management option for IXT.

Intravitreal Ocriplasmin for Vitreomacular Adhesions

January *Ophthalmology*

In subgroup analyses from two randomized trials, Haller et al. evaluated the effects of a single intravitreal injection of ocriplasmin on symptomatic vitreomacular adhesions (VMAs), including those associated with macular holes. They found a consistent treatment effect in favor of ocriplasmin compared with placebo across all subpopulations.

These placebo-controlled, double-masked studies lasted six months and involved a total of 652 patients, 464 of whom received a single injection of ocriplasmin (125 µg). Subgroup analyses were conducted to evaluate the effects on patients with nonsurgical resolution of focal VMA at day 28,



nonsurgical full-thickness macular hole (FTMH) closure at six months, and improvement in best-corrected visual acuity (BCVA) at six months.

The results indicated that younger patients were more likely to achieve resolution of VMA at day 28, as were eyes without epiretinal membrane, eyes with FTMH, phakic eyes, and eyes with a focal VMA less than 1,500 μm in diameter. Eyes with a FTMH width of less than 250 μm were more likely to achieve nonsurgical FTMH closure. Improvements in BCVA occurred more often in younger patients and in those with a lower baseline BCVA.

Visual Impairment and Refractive Errors in the General Population

January *Ophthalmology*

Verhoeven et al. studied the causes and frequency of visual impairment in relation to refractive error. They found that of all refractive errors, high myopia was associated with the most severe visual consequences. Irreversible macular pathologic features were the most common cause of visual impairment in this group.

This population-based study involved a total of 9,176 participants in the Rotterdam Study, all of whom were 55 years of age or older at baseline. They all underwent an extensive ophthalmic exam, including best-corrected visual acuity and objective refraction, fundus photography, visual fields, and optical coherence tomography imaging of the macula and optic disc.

The researchers then calculated cumulative risks and odds ratios of visual impairment for various refractive error categories and determined causes by using all screening information as well as medical records.

Cumulative risks of visual impairment were virtually 0 in all refractive error categories at 55 years of age. When patients were age 85, these risks rose to 9.5 percent in the emmetropia group, 15.3 percent for those with high hyperopia, and 33.7 percent for patients with high myopia. The major

causes of visual impairment in highly hyperopic persons were age-related macular degeneration (AMD), cataract, and combined causes; in highly myopic persons, the major cause was myopic macular degeneration. The major causes of visual impairment in emmetropes and those with other refractive errors were AMD and cataract.

Compared with those individuals with emmetropia, persons with high myopia had a significantly increased lifetime risk of visual impairment. Those with refractive errors between -6 D and -10 D had an odds ratio risk of 3.4 for visual impairment, while those with refractive errors of -10 D or more had an odds ratio of 22.0.

American Journal of Ophthalmology

Clinicopathological Findings in Abusive Head Trauma

December *AJO*

Breazzano et al. investigated the histopathology in a series of autopsy eyes from children with abusive head trauma and found that most eyes had retinal hemorrhages and a torn internal limiting membrane (ILM). A unique finding, cherry hemorrhage, was only found concurrently with hemorrhages extending to the ora serrata.

For this retrospective case-control series, 110 autopsy eyes from 55 cases examined at an academic referral center over 21 years were tabulated for the following findings: subdural hemorrhage in the optic nerve sheath, intrascleral hemorrhage, any retinal hemorrhage, ora-extended hemorrhage, cherry hemorrhage, perimacular ridge, and ILM tear. Selected tissues with cherry hemorrhage were further examined by transmission electron microscopy.

Sixty autopsy eyes were affected by abusive head trauma and 46 by alternative causes of trauma (controls), and four eyes were from abusive head trauma survivors. All ocular histopathologic observations were statistically more frequent in cases of abusive head trauma and, within this group, were

similar and more frequent in infants younger than 16 months of age. When present, a cherry hemorrhage and perimacular ridge were mostly found together, and only in the presence of a torn ILM. Intrascleral hemorrhage always accompanied subdural or retinal hemorrhage.

Agreement of Biometry Values Provided by Various Ophthalmic Devices

December *AJO*

Rozema et al. reviewed the literature to examine the measurement errors for various biometric devices as well as the agreement between devices. The Pentacam, Orbscan, and IOLMaster were used as a reference. The researchers found that biometry measurements taken by different devices should not be considered equivalent. As such, clinical studies involving multiple device types should treat these differences as a within-subject variable in order to avoid bias.

This meta-analysis was based on data from 216 articles comparing 24 different devices for the following parameters: mean, steep, and flat curvature of the anterior and posterior cornea; central corneal thickness; anterior chamber depth; and axial length. After the weighted average difference between devices was determined, the researchers tested for 1) the equivalence between devices within certain thresholds defined by the measurement errors and 2) the influence of these differences on the calculated refraction.

Test devices were equivalent with the reference device within the thresholds set by the measurement error in only 17 of 70 comparisons. More lenient thresholds—based on a change in calculated refraction of ± 0.25 D—increased this number to 25 of 50 comparisons. High degrees of inconsistency were seen in the reported results, which could partially explain the low agreement between devices.

The researchers recommended avoiding the use of different devices in following an individual patient.

Undetected and Untreated Glaucoma in the United States

December *AJO*

Shaikh et al. determined the burden of undetected and untreated glaucoma in patients over the age of 40 years in the United States. They estimated that approximately 2.4 million individuals have undetected and untreated glaucoma. Overall, prevalence of combined cases of diagnosed and undiagnosed glaucoma was much higher in minorities and the elderly. Individuals younger than 60 years of age, however, had a greater proportion of undiagnosed and untreated disease.

For this cross-sectional review, the researchers examined data from the National Health and Nutrition Examination Survey, including retinal photographs, completed interview questions regarding prior diagnosis of glaucoma, and negative responses to questions regarding comorbidities. The study population included 3,850 participants.

Prevalence of undiagnosed and untreated glaucoma was 2.9 percent—more than three-fourths of the 3.7 percent of individuals with definite glaucoma. The demographic distributions of diagnosed and undiagnosed populations were similar in terms of sex, education, and income. African-Americans and Hispanics, however had roughly 4.4 and 2.5 times greater odds, respectively, of having undiagnosed and untreated glaucoma than Caucasians, and individuals younger than 60 years old were more likely to have undiagnosed and untreated glaucoma than those over 70 years of age.

Orthokeratology-Associated Infectious Keratitis

December *AJO*

Chan et al. analyzed cases of orthokeratology-associated infectious keratitis in Hong Kong from 2003 and 2013 and found that it continues to be a serious problem. This is especially the case in regions with a high prevalence of myopia.

This retrospective study included 23 eyes of 23 patients (16 female and seven

male; mean age, 15 years). All patients used overnight orthokeratology for an average of 2.7 years before the onset of infection. Clinical features included corneal infiltrate (14 eyes) and corneal perineuritis (12 eyes). Fifteen eyes had a positive microbiological culture obtained from corneal scrapings. The most commonly isolated organism was *Pseudomonas aeruginosa* (six eyes), followed by coagulase-negative *Staphylococcus* (five eyes) and *Acanthamoeba* (three eyes).

Five cases of both *P. aeruginosa* and *Acanthamoeba* were identified from contact lenses or contact lens solution. The mean duration from disease onset to remission was 31.9 days. All patients responded to medical treatment, and no emergency surgical intervention was needed.

JAMA Ophthalmology

Immediate vs. Delayed Sequential Cataract Surgery

November *JAMA Ophthalmology*

Neel performed a cost minimization analysis comparing immediate sequential cataract surgery (ISCS) with delayed sequential cataract surgery (DSCS) and found that a switch to the former might provide payers and patients with more economic benefits.

This study focused on cataract surgery volume and eligibility estimates, 2012 Medicare reimbursement schedules, and actual and estimated patient cost data from a mixed urban and rural private practice setting in West Tennessee. Ambulatory surgery center and hospital outpatient department costs were then evaluated, and the data were extrapolated to a national model.

Nationally, a switch from DSCS to ISCS was estimated to reduce the payer portion of Medicare costs by approximately \$522 million and the patient portion by \$261 million. For a typical West Tennessee Medicare patient, the switch was estimated to reduce costs by \$174 for direct medical costs, \$40 for travel costs, and \$138 for lost wages (total cost reduction range, \$329-\$649).

Cataract Extraction and Visual Field Decay Rates

November *JAMA Ophthalmology*

Lee et al. investigated a visual field index that is resistant to the effect of cataract formation and extraction by retrospectively evaluating the influence of cataract surgery on the fast and slow components of visual field decay. The researchers found that worsening of the cataract seemed to be the main determinant for the slow component but did not change the fast component.

This study included a group of 68 glaucoma patients with five or more reliable visual fields both before and after surgery.

Pointwise exponential regression was used to perform trend analysis on thresholds at visual field test locations before and after cataract surgery. The test locations were ranked according to the rate of decay and partitioned into slow and fast components. The slow and fast decay components were measured before and after cataract surgery and compared. Linear regressions of mean deviation and visual field index were performed against time and compared before and after cataract surgery.

The average mean deviation was -5.5 dB before and -5.0 dB after cataract surgery. The average visual field index was 86.4 percent before and 86.6 percent after cataract surgery. The average visual field decay rates in the slow component decreased from 0.48 percent to 0.26 percent per year after surgery, whereas no difference was found in the fast component.

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 based on authors' abstracts as edited by senior editor(s).

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ROUNDUP OF OTHER JOURNALS

IOP Spikes During Femtosecond Surgery

Journal of Cataract & Refractive Surgery
Published online Sept. 25, 2014

Baig et al. evaluated intraocular pressure (IOP) profiles during femtosecond laser–assisted cataract surgery with the Victus platform, and they documented a statistically significant increase in IOP during the suction phase compared with baseline IOP.

This prospective case series included 35 patients (41 eyes). IOP was measured using a handheld portable applanation tonometer before, during, and after the suction phase.

The mean IOP before docking and suction was 17.2 ± 3.2 mmHg (range, 10.0–23.0 mmHg). This increased to 42.1 ± 10.8 mmHg (range, 20.0–55.0 mmHg) when the suction was turned on and then decreased to 13.8 ± 3.4 mmHg (range, 9.0–25.0 mmHg) when the suction was switched off and the suction ring was removed.

The researchers characterized femtosecond laser–assisted cataract surgery as a high-pressure surgery system and, based on their findings, recommended careful patient selection, especially for those with advanced glaucoma, optic atrophy, or central retinal artery occlusion.

Malignant Glaucoma After Cataract Surgery

Journal of Cataract & Refractive Surgery
Published online Sept. 20, 2014

Varma et al. presented data on a group of patients who developed malignant glaucoma following uneventful cataract surgery with in-the-bag placement of an intraocular lens (IOL). They found that in a majority of cases, malignant glaucoma occurred in female hyperopic patients and did not respond well to medical therapy.

This retrospective case series in-

cluded 18 patients (20 eyes) with a diagnosis of malignant glaucoma that occurred after phacoemulsification with in-the-bag IOL placement. All patients were women, and most were hyperopic before cataract surgery. In addition, they tended to have short axial lengths and shallow anterior chamber (AC) depths. Mean age was 67.5 ± 13.7 years (range, 44–86 years).

Malignant glaucoma tended to occur within the first six weeks after cataract surgery. In addition, the patients typically presented with myopic surprise, shallow ACs centrally and peripherally, and narrow or closed angles with elevated IOP.

The condition was treated successfully in all cases using a stepwise approach. Only two of the 20 eyes responded to medical therapy; the rest needed cycloplegia, laser iridotomy, laser iridoplasty, AC reformation with IOL pushback, or vitrectomy.

Femtosecond Laser Results in Longer Surgical Time

Journal of Cataract & Refractive Surgery
Published online Sept. 10, 2014

Does use of the femtosecond laser add to the total time it takes to perform cataract surgery? According to a retrospective review by Lubahn et al. conducted at an academic referral center, the answer is yes.

The researchers evaluated data from three attending surgeons who operated in an OR that housed the femtosecond laser during its first six months of use. For both traditional and femtosecond laser–assisted cataract surgeries, OR time was measured from the time that patients entered the room to the time that they left.

Over a six-month period, the surgeons performed 420 cataract cases in the designated OR; of these cases, the femtosecond laser was used in 162 (38.6 percent). These laser-assisted procedures took 11.1 to 12.1 minutes longer than did the traditional surger-

ies. And when only routine cases were compared, the laser-assisted cases still took longer to perform (range, 11.6–13.4 minutes). This additional time included preparatory actions such as moving the patient to the fixed bed of the laser, making limbal marks for astigmatism correction, entering computer data, and docking the patient interface.

Neurodegeneration and Oral Microbiome in Glaucoma

PLoS One

Published online Sept. 2, 2014

Agrowing body of research on the role of the microbiome in degenerative diseases led Astafurov et al. to hypothesize that chronic subclinical peripheral inflammation may contribute to neurodegeneration in glaucoma.

Mouthwash specimens from patients with glaucoma were analyzed for the amount of bacteria and were found to have higher bacterial counts than controls. To determine a possible pathogenic mechanism, low-dose subcutaneous lipopolysaccharide was administered in two separate animal models to simulate chronic subclinical peripheral inflammation.

This exposure to lipopolysaccharide resulted in greater axonal degeneration and neuronal loss, with evidence of microglial activation in the optic nerve and retina as well as upregulation of TLR4 signaling and the complement system pathways. The enhanced neurodegeneration was partially ameliorated by the administration of naloxone, which is a partial TLR4 inhibitor.

Based on these findings, the researchers suggested that patients with glaucoma may be exposed to higher levels of bacterial products over time, which could exacerbate the severity or progression of the disease.

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