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RETINA DIGEST®

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Association of Cataract Surgery and Age-related Macular Degeneration

Age-related macular degeneration (AMD) and cataract, the leading causes of visual impairment and blindness, often coexist, raising concerns about a possible association between cataract surgery and AMD occurrence and progression. To determine the existence of this association, Park et al from the Seoul National University College of Medicine, South Korea, conducted a cross-sectional study of a representative Korean population.

The Korean National Health and Nutrition Examination Survey (KNHANES) database yielded data from health interviews and examinations of 20,419 patients aged ≥ 40 years who had had cataract surgery and AMD grading between 2008 and 2012. Of the eligible patients who participated during the study period (mean age, 55.83 years; 51.9% women), 17,987 had available information regarding their cataract surgery sta-

tus and gradable fundus photographs of ≥ 1 eye and were included in the study.

- The right-eye analysis included 17,616 eyes; 1264 (5.5%) had undergone cataract surgery, 1056 (5.0%) exhibited signs of AMD and 13 were aphakic.
- The left-eye analysis included 17,247 eyes; 1235 (5.4%) had undergone cataract surgery, 949 (4.5%) exhibited signs of AMD and 11 were aphakic.

Generalized estimating equation and logistic regression models used multivariate adjusted odds ratios (ORs) and 95% confidence intervals (CIs) to evaluate the association in both right

Inside This Issue

- Is Ambient Air Pollution a Risk Factor for CRAO?
- Outcomes of Vitrectomy for Terson Syndrome
- Eye Complications And Well-being in Patients with Diabetes

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and left eyes between any form of AMD (early, late and all) and cataract surgery. An association between cataract surgery and any AMD was not observed in the right eyes, but an association with late AMD was observed in the left eyes (OR 2.34; 95% CI, 1.13–4.85; $p = .02$).

While recent studies have found that most AMD patients had improved visual function and quality of life after undergoing cataract surgery, this study concluded that an association between cataract surgery and AMD in a representative Korean population remained unclear. AMD characteristics of Asian and white patients are quite different, especially in AMD's genetic architecture. Additional long-term studies are needed to further elucidate the underlying association between cataract surgery and AMD in Asian populations. This study's results may help guide cataract surgery in Asian patients with AMD.

Park SJ, Lee JH, Ahn S, Park KH. Cataract surgery and age-related macular degeneration in the 2008-2012 Korea National Health and Nutrition Examination Survey. *JAMA Ophthalmol* 2016;134:621-626.

Is Ambient Air Pollution a Risk Factor for CRAO?

While only 1 in every 100,000 people presents with central retinal artery occlusion (CRAO), it is one of the leading causes of acute permanent vision loss. CRAO patients typically have shorter life spans, increased cardiovascular risk factors and higher chance of stroke. Similar to ischemic cerebral stroke, CRAO is caused by thrombotic or embolic occlusion of the central retinal artery.

With evidence that air pollutants are significantly associated with an increased risk of stroke, and given the similarities between CRAO, ischemic stroke and myocardial infarction, gaseous and particulate air pollution may be associated with CRAO onset, particularly in patients with cardiovascular risk factors. To investigate whether daily changes in ambient air pollution levels could be associated with an

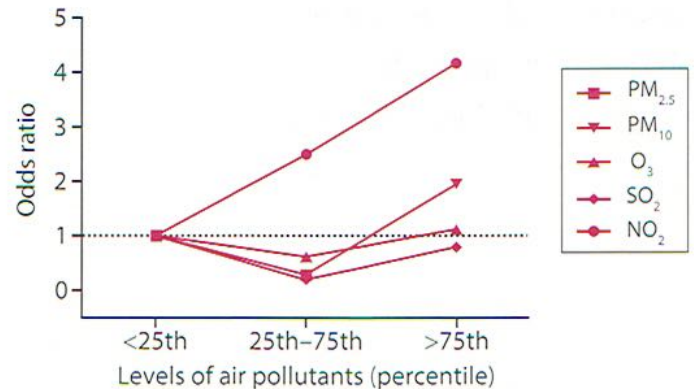


Figure 1. Odds ratio (OR) of CRAO onset for mean ambient air pollutant levels in the 6 days preceding CRAO, stratified by <25th, 25th to 75th, and >75th percentile. Only NO₂ showed a dose-response relationship to the onset of CRAO (OR 2.5; 95% confidence interval [CI], 0.49–12.89; $p = .27$ in 25th to 75th vs <25th percentile; OR 4.2; 95% CI, 0.47–36.74; $p = .20$ in >75th vs <25th percentile). The analysis of >75th percentile of PM_{2.5} was not performed because both case and control periods of these patients were within the subgroup of >75th percentile.

increased risk of CRAO, Cheng et al from the National Yang-Ming University, Taiwan, conducted a retrospective population-based cohort study using a representative sample of 1 million registered beneficiaries of the Taiwan National Health Insurance program. A database search found 266 patients newly diagnosed with CRAO between 2001 and 2013; of these, 96 (mean age, 65.6 ± 12.7 years; 32.3% women) were included in the study.

Conditional logistic regression analyzed the association between CRAO events and air pollution factors. Individualized exposure to ambient air pollution was based on the date of CRAO onset and each patient's place of residence. Odds ratios were determined based on the recorded concentrations of 5 analyzed air pollutants: particulate matter $\leq 2.5 \mu\text{m}$ (PM_{2.5}), particulate matter $\leq 10 \mu\text{m}$ (PM₁₀), nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and ozone (O₃). Only NO₂ showed a dose-response relationship (Figure 1).

This study demonstrated a positive association between certain air pollutants and CRAO onset among subsets of patients, including

- elderly patients (≥ 65 years old)

- patients with diabetes mellitus
- hypertensive patients
- patients with hyperlipidemia

To verify these results and guide future public policy, a prospective cohort study utilizing ambulatory personal air pollution monitors may be needed. In the meantime, the authors suggested that CRAO risk may be minimized by altering activity patterns on high pollution days, reducing traffic density or reducing fossil fuel combustion.

Cheng H-C, Pan R-H, Yeh H-J, et al. Ambient air pollution and the risk of central retinal artery occlusion. Ophthalmology 2016;123:2603-2609.

Outcomes of Vitrectomy for Terson Syndrome

Terson syndrome, albeit relatively rare, has evolved from being described as a vitreous hemorrhage to a broader term often used to characterize intraocular hemorrhages that occur in combination with any type of acute intracranial hemorrhages (Figure 2). Although surveillance studies suggest that some type of intraocular hemorrhage occurs in 8% to 29% of all acute subarachnoid hemorrhages, intracranial hemorrhage-induced ocular bleeding is often missed clinically.

When the fundamental intracranial pathology is secondary to traumatic brain injury, intraocular hemorrhages, compared with other Terson syndrome causes, are thought to occur less frequently. Favorable visual acuity outcomes have been reported for many patients with vitreous hemorrhages from Terson syndrome without need for surgical intervention. However, surgical vitrectomy has shown rapid and meaningful results in patients with dense hemorrhages or hemorrhages that fail to resolve after a given observation period.

Little is known about how the timing of vitrectomy (early vs delayed) for Terson syndrome, especially when secondary to traumatic brain

injury, affects postoperative visual outcomes. Thus, Narayanan et al from the L V Prasad Eye Institute, India, conducted a retrospective observational case study to evaluate the post-vitrectomy visual outcomes for intraocular hemorrhages secondary to traumatically induced brain injury.

Between December 1997 and July 2015, 28 eyes in 20 male patients (mean age, 36.6 ± 11.6 years) underwent pars plana vitreoretinal surgery for intraocular hemorrhages secondary to brain trauma sustained from motor vehicle accidents. Baseline characteristics for each patient included age at diagnosis, diagnostic procedures, cause and duration of hemorrhage, and history of ophthalmic surgery. The cohort was divided into 2 groups related to the date of initial injury:

- **Early vitrectomy:** Patients who underwent vitrectomy <3 months after the onset of an intracranial event.
- **Delayed vitrectomy:** Patients who underwent vitrectomy >3 months after the onset of an intracranial event.

Each patient's final best-corrected visual acuity (BCVA) was the primary outcome; BCVA was measured at

- **baseline preoperative:** mean, 1.81 ± 0.56 log-MAR (20/1290 Snellen)
- **1-day postoperative:** mean, 1.26 ± 1.01 log-MAR (20/360 Snellen)
- **1-month postoperative:** mean, 0.30 ± 0.33 log-MAR (20/40 Snellen)
- **final follow-up:** mean, 0.15 ± 0.24 logMAR (20/30 Snellen)

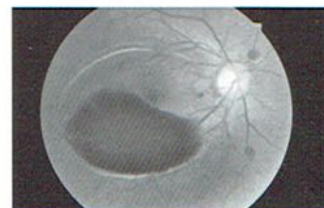


Figure 2. Fundus photograph of Terson syndrome. (Image courtesy of Dr. Daniel Berinstein.)

The median follow-up duration after surgery was 8.7 months.

While there was a significant difference between the preoperative and postoperative BCVA, there was no



apparent correlation between preoperative visual acuity as a predictor of final postoperative visual acuity outcome. Surgical intervention effectively provided rapid visual recovery in the majority of patients with intraocular hemorrhages secondary to traumatic brain injury. This information could potentially help neurosurgeons and vitreo-retinal surgeons with future surgical planning.

Narayanan R, Taylor SC, Nayaka A, et al. Visual outcomes after vitrectomy for Terson syndrome secondary to traumatic brain injury. Ophthalmology 2017;124:118-122.

Eye Complications And Well-being in Patients with Diabetes

Diabetic retinopathy (DR), a common complication of diabetes, is characterized by an asymptomatic nonproliferative stage (NPDR) and a symptomatic proliferative stage (PDR). PDR and diabetic macular edema (DME) often cause vision loss and can result in negative psychological outcomes, especially for patients with complications, such as DR, which can affect a patient's quality of life and emotional state.

To understand the impact of DR on anxiety and depression, Rees et al from the University of Melbourne, Australia, examined 519 patients with diabetes (mean age, 64.9 ± 11.6 years; 32.8% women) seen at an Australian eye clinic from March 2009 to December 2010. A comprehensive examination comprised of an interviewer-administered questionnaire and a recording of clinical, anthropometric and biochemical measures, including levels of hemoglobin A_{1c}, fasting blood glucose and serum lipids, was administered.

To evaluate anxiety and depression, the Hospital Anxiety and Depression Scale (HADS) includes 14 questions, 7 related to anxiety and 7 to depression, with scores based on a 4-point category scale (0–3); total scores ranged from 0 to 21 (scores ≥ 8 signify possible anxiety or

depression). After excluding patients medicated for depression and anxiety and patients who did not complete the HADS,

- 310 patients (59.7%) had DR
- 149 (28.7%) had DME
- 262 (50.5%) had some loss of visual acuity

Of the 519 patients, 445 (85.7%) reported comorbidities, and 165 (31.8%) reported other complications of diabetes in addition to DR. Raw scores indicated that 80 patients (15.4%) screened positive for depression, and 118 patients (22.7%) screened positive for anxiety.

DME did not appear to be associated with depressive symptoms; DR did not appear to be associated with symptoms of anxiety, but severe DR was associated with depression. A self-reported history of anxiety or depression was consistently associated with heightened psychological symptoms in patients with diabetes and was the most important risk factor for depressive symptoms.

These results support previous findings of an association between vision-threatening stages of DR and depressive symptoms independent of a history of anxiety or depression and vision impairment. Understanding the severity and progression of DR may prompt further psychological well-being assessment in patients with diabetes presenting with other risk factors. Further studies are needed to determine the clinical significance of this association.

Rees G, Xie J, Fenwick EK, et al. Association between diabetes-related eye complications and symptoms of anxiety and depression. JAMA Ophthalmol 2016;134:1007-1014.

AUTUMN 2017

- Intravitreal injection and posterior capsule rupture
- Macular hole and AMD
- Diabetic tractional retinal detachment

**In The
Next Issue**