A Professional Courtesy of:

Faruk M. Koreishi, M.D.
Paul J. Lee, M.D.

Mehdi Khan, D.O.
Christopher M. Jermak, M.D.

Retina CONSULTANTS OF WESTERN NEW YORK

Williamsville
531 Faber Lakes Drive
Williamsville, NY 14221
716-632-1595

Orchard Park
3055 Southwestern Boulevard
Suite 108
Orchard Park, NY 14127
716-712-2440

Niagara Falls
6930 Williams Road
Building C, Suite 3800
Niagara Falls, NY 14304
716-205-0151

www.wnyretina.com

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Inside This Issue

Sleep-disordered Breathing and Diabetic Retinopathy

Sleep-disordered breathing (SDB), defined as 4% oxygen desaturation index (ODI) at least 5×/hour, has been associated with arteriosclerotic diseases and is a possible risk factor for hypertension, coronary artery disease, cerebrovascular disease and renal disease. While there also appears to be a correlation between SDB and proliferative diabetic retinopathy (PDR), the reasons, if any, for this correlation are unclear. Shiba et al from the Toho University Sakura Medical Center, Japan, conducted a case-control study to clarify the relationship between SDB and PDR.

The study included 166 patients, 48 with nonproliferative PDR (NPDR) who had undergone vitreous or cataract surgery to treat epimacular membranes or macular edema and 118 patients with PDR who had undergone vitreous surgery to treat macular edema, vitreous hemorrhage, traction retinal detachment or neovascular glaucoma. Data were collected on patients' gender, age, duration of diabetes, body mass index (BMI), hypertension and hematocrit value, preoperative glycated hemoglobin value and estimated glomerular filtration rate. Each patient wore a pulse oximeter to measure blood oxygen saturation (SpO_2%); the data were used to calculate 4% ODI ×/hour and mean SpO_2% during sleep.

The 2 groups showed significant differences in age (NPDR group mean 65.3 ± 6.5 years, PDR group mean 59.6 ± 9.7 years; $p = .0002$), BMI (NPDR group mean

23.1 ± 3.3 kg/m^2, PDR group mean 24.8 ± 4.1 kg/m^2; p = .01) and 4% ODI (NPDR group mean 4.1 ± 4.6 ×/hour, PDR group mean 7.2 ± 7.6 ×/hour; p = .003). The groups did not differ in mean SpO_2% (NPDR group 97.6 ± 1.2%, PDR group 97.3 ± 1.6%; p = .22). Patients in the PDR group had significantly more SDB diagnoses (47.5% vs 29.2%; p = .03; Table 1). Multiple regression analysis identified 2 variables as independent factors contributing to a diagnosis of PDR: younger age (p <.0001) and higher 4% ODI (p = .03).

The results of this study suggest that SDB is related to the development of PDR. Intermittent hypoxemia and reoxygenation, hypercapnia and arousal result from SDB, leading to sympathetic hyperactivity, increased levels of inflammatory cytokines, increased oxidant stress and increased expressions of adhesion factors, all of which appear to exacerbate endothelial dysfunction, which triggers atherosclerosis. SDB also increases insulin resistance and causes glucose intolerance. Many of these factors are also associated with the pathogenesis and development of PDR.

Because the study was restricted to inpatients in order to conduct SpO_2% measurements, the number of patients included was small. However, based on these results, the authors believe that a relationship between the development of PDR and nocturnal desaturation and reoxygenation is a reasonable conclusion worthy of further study.

Table 1. *Results of SDB evaluations in patients with NPDR and PDR*

	NPDR group (n = 48)	PDR group (n = 118)	p value
4% ODI (×/hour)	4.1 ± 4.6	7.2 ± 7.6	.003
Mean SpO_2 (%)	97.6 ± 1.2	97.3 ± 1.6	.22
SDB prevalence	29.2%	47.5%	.03

Shiba T, Sato Y, Takahashi M. Relationship between diabetic retinopathy and sleep-disordered breathing. Am J Ophthalmol *2009;147:1017-1021.*

Safety of Sutureless Pars Plana Vitrectomy

The last 20 years have seen a significant decrease in the incidence of endophthalmitis after pars plana vitrectomy (PPV). While sutureless 25-gauge PPV surgery allows a quicker, more comfortable recovery, some studies have suggested as much as a 28-fold higher rate of endophthalmitis for sutureless 25-gauge PPV, compared with the 20-gauge sutured PPV. Hu et al from the University of California, Los Angeles, retrospectively reviewed all patients who underwent either 20- or 25-gauge PPV at the Jules Stein Eye Institute from January 2002 through January 2008 for incidence of endophthalmitis.

Of the 3372 patients who met the inclusion criteria (including follow-up of ≥1 week), 1948 underwent 20-gauge PPV, and 1424 underwent 25-gauge PPV. Patients undergoing 25-gauge PPV were significantly older than those undergoing 20-gauge PPV (64.4 ± 16.5 years vs 54.6 ± 22.6 years; p < .0001). All 25-gauge PPVs included in the analysis had ≥1 sutureless sclerotomy; in 70 (5%) cases, ≥1 sclerotomy was sutured. Identical infection prevention procedures were followed during all surgery. At the end of the surgery, patients received subconjunctival antibiotics (cephalosporin) and steroid (dexamethasone). Postoperatively, all patients were administered topical fluoroquinolone, prednisolone acetate 1% and atropine 1% for ≥1 week.

No patients who underwent 20-gauge PPV developed endophthalmitis; 1 patient who underwent 25-gauge PPV developed endophthalmitis, a statistically insignificant difference (p = .42). Significant differences between 20-gauge and 25-gauge procedures included use of intravitreal triamcinolone >3× more frequently during surgery (3.7% and 13.6%, respectively; p < .001), use of air or longer-acting gasses (38.8% and 68.4%, respectively; p < .0001) and use of silicone oil

(35.3% and 2.0%, respectively; $p < .0001$).

These results differ from those reported by Kunimoto et al (*Ophthalmology* 2007) and Scott et al (*Retina* 2008; Table 2). The current authors suggested the possibility that the high proportion of air/gas endotamponade use compared with fluid may help seal the sclerotomy from the inside and reduce the incidence of endophthalmitis. This report suggests that 25-gauge PPV carries no greater risk for the development of endophthalmitis than 20-gauge PPV.

Table 2. *Comparison of endophthalmitis incidence rates after 20- and 25-gauge PPV in recently published case series*

	Kunimoto et al* (18 surgeons, 1 center)	Scott et al† (8 surgeons, 7 centers)	Hu et al (7 surgeons, 1 center)
20-gauge endophthalmitis incidence	1/5498 (0.018%)	2/6375 (0.03%)	0/1948 (0%)
25-gauge endophthalmitis incidence	7/3103 (0.23%)	11/1303 (0.84%)	1/1424 (0.07%)
p value‡	.004	<.001	.42

*Ophthalmology *2007;* †Retina *2008;* ‡*Fisher exact test, 2-tailed.*

Hu AYH, Bourges J-L, Shah SP, et al. Endophthalmitis after pars plana vitrectomy: a 20- and 25-gauge comparison. Ophthalmology *2009;116:1360-1365.*

Relationship Between AMD And Cataract Surgery

Cataract and age-related macular degeneration (AMD) share common risk factors, but it is unclear whether or not the 2 disorders are directly related. Chew et al from the National Eye Institute, Maryland, analyzed the Age-Related Eye Disease Study (AREDS) data to evaluate the risk of developing AMD after cataract surgery.

From retina specialty clinics, 4577 study participants (age range, 55–80 years) with best-corrected visual acuity of 20/32 or better in at least 1 eye were assessed for progression to neovascular AMD or geographic atrophy. The following categories were established:

- **Category 1**: No AMD (<5 small drusen [<63 μm in diameter]) and visual acuity of 20/32 or better in both eyes.
- **Category 2**: Mild AMD lesions (multiple small drusen, <20 intermediate drusen [63–124 μm in diameter], pigment abnormalities or a combination of both) in the most advanced eye and visual acuity of 20/32 or better in both eyes.
- **Category 3**: Absence of advanced AMD in both eyes (≥1 large drusen [≥125 μm in diameter], extensive intermediate drusen, geographic atrophy not involving the center of the macula, or a combination of these 3) and visual acuity of 20/32 or better in at least 1 eye.
- **Category 4**: No advanced AMD and visual acuity of 20/32 or better in the study eye, and either lesions of advanced AMD or visual acuity <20/32 and AMD abnormalities sufficient to explain reduced visual acuity in the fellow eye.

During the 11 years of the study, 1167 participants underwent cataract surgery. The hazard ratios of developing neovascular AMD after cataract surgery among eyes in categories 2, 3 and 4 were 1.20 (95% confidence interval [CI], 0.82–1.75) for right eyes and 1.07 (95% CI, 0.72–1.58) for left eyes. All values were nonsignificant.

The authors speculated that the lack of a possible relationship between cataract surgery and development of AMD might be the result of improved surgical techniques and better lenses available to the participants in the

23.1 ± 3.3 kg/m^2, PDR group mean 24.8 ± 4.1 kg/m^2; p = .01) and 4% ODI (NPDR group mean 4.1 ± 4.6 ×/hour, PDR group mean 7.2 ± 7.6 ×/hour; p = .003). The groups did not differ in mean SpO_2% (NPDR group 97.6 ± 1.2%, PDR group 97.3 ± 1.6%; p = .22). Patients in the PDR group had significantly more SDB diagnoses (47.5% vs 29.2%; p = .03; Table 1). Multiple regression analysis identified 2 variables as independent factors contributing to a diagnosis of PDR: younger age (p <.0001) and higher 4% ODI (p = .03).

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