Impact of Availability of Anti–Vascular Endothelial Growth Factor Therapy on Visual Impairment and Blindness Due to Neovascular Age-Related Macular Degeneration

A nti–vascular endothelial growth factor (VEGF) therapy has revolutionized the treatment of neovascular age-related macular degeneration (AMD).1,2 Recent theoretical modeling suggests that monthly anti-VEGF therapy may dramatically decrease the incidence of blindness due to AMD in this country.3 We describe 2 cohorts of patients with incident neovascular AMD in the last decade, selected to have 1 cohort before and 1 after the advent of anti-VEGF therapy to explore whether there are data to support the theoretical model in a clinical practice setting.

Methods. In this retrospective cohort study, all cases of choroidal neovascularization secondary to AMD seen by 2 of us (N.M.B. and S.B.B.) in 2002 and 2008 were identified from record review and billing records. All eyes with incident neovascular AMD and at least 12 months of follow-up were included. Records were reviewed for baseline demographic variables, types of treatment received, and follow-up visual acuity (VA) at 24 (±6) months. For patients with follow-up less than 19 months, 2-year data were imputed with the last observation. The primary outcome measure was the prevalence of legal blindness (defined as VA of ≤20/200 OU) in each cohort at 2 years. The secondary outcome was the prevalence of mild or moderate visual impairment, defined as the development of VA less than 20/40 (mild) or less than 20/80 (moderate) in the better-seeing eye, at 2 years. Multivariable logistic regression analysis was performed, adjusting for age, gender, and baseline VA.

Results. Totals of 84 patients (91 eyes) in 2002 and 41 patients (43 eyes) in 2008 were identified with incident neovascular AMD and longer than 12 months of follow-up. Twenty-six of 91 eyes (29%) in the 2002 cohort and 3 of 43 eyes (7%) in the 2008 cohort had follow-up less than 19 months, for which 2-year data were imputed. Subsequent to 12 months following treatment initiation, most patients had stable vision. Two-year outcomes were analyzed with and without imputed data and no substantive differences were apparent. Baseline characteristics in the 2 cohorts appeared comparable with respect to mean age (77 years in 2002, 76 years in 2008), gender (39% women in both cohorts), and prevalence of neovascular AMD in the fellow eye (45% in both cohorts). Mean baseline VA in the study eye was slightly worse in 2002 (20/80; 95% CI, 20/50-20/125) than in 2008 (20/63; 95% CI, 20/32-20/80), for which results were adjusted using multivariable logistic regression in reported data. Forty of 41 patients (98%) in the 2008 cohort received anti-VEGF therapy. This therapy was not available for the 2002 group, who were managed using photodynamic therapy, laser photocoagulation, or observation. The Table shows the 2-year prevalence of legal blindness, mild and moderate visual impairment in both cohorts, the 2-year prevalence of visual impairment in the study eye, and the relative odds of outcomes adjusted for age, gender, and baseline VA in the study eye.

Comment. This study confirms that the prevalences of legal blindness and moderate visual impairment 2 years following the diagnosis of neovascular AMD have decreased substantially following the introduction of anti-VEGF therapy. These data correspond well to theoretical modeling data previously published.3 There are several limitations inherent to this retrospective cohort study, including the unknown effect of the exclusion of patients who did not have continued follow-up and use of a cohort from a tertiary academic-based center. Nonetheless, the results suggest that despite the increasing prevalence of neovascular AMD, the prevalence of blindness due to neovascular AMD is decreasing provided that the stabilization in VA between 12 and 24 months is maintained thereafter.

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**Intravitreous Tissue Plasminogen Activator With Pneumatic Displacement in Submacular Hemorrhage**

Submacular hemorrhage–induced retinal damage appears to vary directly with the duration of hemorrhage. Hence, many investigators have advocated early evacuation of subretinal hemorrhage to minimize these damaging effects. In 1996, Heriot1 presented the benefits of the minimally invasive procedure of enzymatically liquefying the submacular blood with tissue plasminogen activator (tPA) and displacing it with gas. Many studies have since shown good results with this procedure, but the exact time of the intervention is still debatable.2,3 Although there is no consensus, submacular bleeding for more than 28 days is generally believed to give poor results.4 We report a case of submacular bleeding for 60 days that showed dramatic clearing within a day with tPA and gas.

**Report of a Case.** A 55-year-old, nondiabetic, nonhypertensive woman of Asian Indian origin had sudden decreased vision in her left eye for 2 months. Her visual acuity was 20/20 OD and 20/200 OS. The left eye revealed a reddish brown mound of subretinal blood over the posterior pole, about 5 to 6 disc diameters in size. Some of the subretinal hemorrhage was altered and yellow, indicating a long duration (Figure 1A). Indocyanine green angiography revealed a hypofluorescent area corresponding to the area of subretinal blood, and no hot spot was found (Figure 1B). Provisional diagnosis of idiopathic polypoidal choridoidopathy causing submacular bleeding was made. The left eye was treated with intravitreous tPA with perfluoropropane gas. Topical anesthesia was achieved with topical proparacaine hydrochloride, 0.5%, ophthalmic eyedrops. Irrigation of the conjunctival cul de sac with povidone-iodine, 5%, was performed. Commercial tPA, diluted with balanced salt solution to a concentration of 100 µg/0.1 mL, and 0.3 mL of pure perfluoropropane gas were then injected via a 30-gauge needle introduced through the pars plana into the vitreous cavity. A paracentesis was then performed to reduce the intraocular pressure. After ensuring optic nerve head perfusion, the eye was covered with a sterile eye pad and the patient was allowed to go home. The patient was advised to maintain a supine position for the first 6 hours to facilitate tPA diffusion through the retina and then remain prone for at least 8 hours a day for 5 days. The next day, the left eye showed complete resolution of the un-

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**Figure 1.** A 55-year-old woman had decreased vision in her left eye for 2 months. A, Fundus photograph showed a reddish brown submacular hemorrhage with an area of altered, yellow hemorrhage. B, Indocyanine green angiography revealed a hypofluorescent area with no hot spots. The probable cause was idiopathic polypoidal choroidal vasculopathy.