Effect of Depression on Vision Function in Age-Related Macular Degeneration

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Objectives: To report the prevalence rate of depression in older patients with recent vision loss due to age-related macular degeneration (AMD) and to describe the effect of depression on self-reported vision function during 6 months.

Methods: Prospective cohort study of 51 older patients with recent-onset bilateral AMD attending the Retina Clinic of Wills Eye Hospital, Philadelphia, Pa. Main outcome measures included the Center for Epidemiologic Studies Depression Scale, visual acuity, Functional Vision Screening Questionnaire, Chronic Disease Score, and Community Disability Scale.

Results: Seventeen patients (33%) were depressed at baseline and had worse visual acuity ($P=0.04$) and greater levels of vision-specific ($P=0.03$) and general ($P=0.002$) physical disability than nondepressed patients. The correlations of Center for Epidemiological Studies Depression Scale score with visual acuity and visual-specific disability, however, were not significant after controlling for general physical disability. An increase in depressive symptoms over time predicted decline in self-reported vision function independent of changes in visual acuity or medical status ($P<0.05$).

Conclusions: The prevalence and disabling effects of depression in older patients with AMD are substantial. Recognizing that depression is a treatable disorder that exacerbates the effects of AMD will lead to improved outcomes. Innovative interventions to prevent or treat depression in specialty eye clinics are possible.

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The prevalence and disabling effects of age-related macular degeneration (AMD) are increasing as the population ages.1 Williams,2 Mangione,3 and Scott4 et al demonstrated that AMD causes high levels of emotional distress and reduced quality of life. However, whereas the first 2 studies noted weak, nonsignificant relationships between visual acuity and quality-of-life measures, the latter found that worse visual acuity was associated with emotional distress.2,4 Brody et al5 found high rates of depression and significant correlations between depression and vision-specific and general disability but not with visual acuity. They have previously found that the relationship between visual acuity and depression is mediated by the loss of valued, discretionary activities.6 These studies show that, although AMD substantially disrupts the quality of patients' lives, its disabling effects and not its severity per se predict depression.

The studies cited above have been cross sectional, however, and are confounded by the reciprocal relationships between depression and disability (ie, disability leads to depression, depression exacerbates disability). There have been no longitudinal studies investigating changes in visual acuity, disability, and depression to clarify these relationships, to our knowledge. In this prospective study, we report the prevalence rate of depression in older patients with recent-onset bilateral AMD and describe the longitudinal relationships between changes in visual acuity, vision function, and depression in these patients.

RESULTS

Seventeen patients (33%; 95% confidence interval [CI], 19.9-47.0) were depressed (CES-D score >16) at baseline (ie, 6 weeks after vision loss in the second eye). Table 1 compares their demographic and clinical characteristics with those of the 34 nondepressed patients. Depressed subjects had worse visual acuity and greater levels of both vision-specific and general physical disability than nondepressed patients but were otherwise comparable in severity of comorbid medical disorders and demographic characteristics.

Depression scores were significantly correlated with vision-specific disability ($r=0.31; 95% CI, 0.04-0.54$), gen-
PATIENTS AND METHODS

We screened consecutive patients at the Wills Eye Hospital Retina Service, Philadelphia, Pa, to identify those with preexisting AMD in one eye with visual acuity worse than 20/70, who had vision loss in the second eye due to exudative AMD within the preceding 6 weeks resulting in visual acuity worse than 20/70. We chose these criteria to identify subjects with sufficiently impaired vision to cause functional limitations and recent onset of bilateral vision loss. Additional inclusion criteria were age greater than 64 years and residence within 25 miles of Wills Eye Hospital. We excluded cognitively impaired subjects (eg, 3 or more errors on the Kahn-Goldfarb Mental Status Questionnaire).7

Potential subjects (N=109) were screened from January 1, 1998, to July 31, 1998, until the planned enrollment of 51 subjects was completed. We based this sample size on the previously reported strong correlation (r=0.44; confidence interval, 0.19-0.64) of the Geriatric Depression Scale with general function in visually impaired subjects.8 With the proposed sample of 51, the study has 92.9% power (α=0.05, 2-tailed) to detect a moderate correlation between depression and disability. Sixty-four subjects met the inclusion criteria and 51 (79.7%) agreed to the in-home clinical interview. There were no differences in demographic or vision characteristics between those who refused and subjects who were enrolled. We reinterviewed 46 subjects (90% of those enrolled) 6 months later. The Thomas Jefferson University institutional review board approved this investigation; all subjects provided informed signed consent. The Batelle Center for Public Health Research and Evaluation, Baltimore, Md, conducted the in-home interviews. Two graduate-level professional surveyors assessed depressive symptoms and visual and physical disability. Ophthalmologic diagnoses and distance acuity were ascertained from subjects’ Wills Eye Hospital records.

We evaluated depression by means of the Center for Epidemiological Studies–Depression (CES-D) Scale.9 This instrument contains 20 items that assess the severity and frequency of depressive symptoms during the past week. The CES-D scores range from 0 to 60; higher scores indicate more severe depressive symptoms. A score of 16 or higher has high sensitivity and specificity rates for identifying subjects with depressive disorder.10 Patients with CES-D scores greater than 16 were categorized as depressed in this study.

Baseline visual acuity (best-corrected distance visual acuity in the better eye) was measured at Wills Eye Hospital by means of the Snellen eye chart. Visual acuity at 6 months was obtained from Wills Eye Hospital and community ophthalmologists’ records. Distance acuity was transformed into the logarithm of the minimum angle of resolution (logMAR), which converts visual fractions to a metric value more easily fitted to statistical analyses.

We used the Chronic Disease Score (CDS) to provide an objective measure of medical morbidity derived from a weighted sum of medications taken for chronic disease.11 Clark et al12 validated the CDS on more than 250,000 managed care enrollees and found that it predicts health care utilization, costs, hospitalization, and mortality.13 The CDS is scored as projected yearly total health care costs in dollars.

We assessed vision-related disability by means of the Functional Vision Screening Questionnaire, which consists of 13 self-rated yes-no items that rate performance on vision-related tasks (eg, watching television, reading newspaper, recognizing faces, driving). Scores range from 0 to 15, with higher scores indicating greater disability. A score of 9 has sensitivity of 0.72 and specificity of 0.94 to detect patients with a corrected distance acuity of 20/70 or worse.14 The term vision function refers to self-rated Functional Vision Screening Questionnaire scores.

We used the Community Disability Scale to assess activities of daily living, instrumental activities of daily living, and mobility.15 This 28-item instrument was used in the East Baltimore Mental Health Epidemiologic Catchment Survey on 175,000 adults. Higher scores indicate greater disability.

Initial analyses consisted of comparing subjects who were and were not depressed at baseline by means of 1-way analyses of variance for linear and categorical variables, respectively. A multiple regression analysis was used to delineate correlates of baseline CES-D score. Six-month change in vision function was evaluated with a separate multiple regression.

eral physical disability (r=0.57; 95% CI, 0.36-0.93), and logMAR (r=0.34; 95% CI, 0.07-0.56) (all P<.05) but not with CDS (r=−0.04). The LogMAR was significantly correlated with vision function (r=0.41; 95% CI, 0.15-0.72; P<.003) but not with general function (P=.9).

Table 2 shows the results of a multiple regression analysis with CES-D score as the dependent measure. Vision function, general function, visual acuity, and CDS were the independent measures and were entered on one block. Only general function was significant (P<.001), indicating that vision-specific disability and acuity were not uniquely related to depression after controlling for physical disability. We found identical results in models including either vision-specific disability or visual acuity but not both simultaneously.

There were complete 6-month follow-up data on 40 (78%) of the 51 subjects. We compared the 40 subjects with complete data with the 11 without and found no differences in demographic characteristics, function (both vision-specific and general), or visual acuity. Those without complete data, however, had higher mean CES-D scores at baseline (mean, 17.3; SD, 8.8) than subjects with complete data (mean, 10.5; SD, 7.7; P=.02). Other research confirms that older subjects lost to follow-up in longitudinal studies tend to be more depressed and less physically healthy.15 This suggests that our results might be biased toward more functional patients with AMD and underestimate the psychological needs of patients with AMD. Of the 13 patients with depression at baseline on whom follow-up data were available, 7 remained depressed at 6 months. The 6 “remitted” patients continued to have depressive symptoms (mean CES-D score, 10.8; SD, 3.8), however, exceeding that reported in older persons in the community (mean CES-D score, 8.06; SE, 0.19).16 One depressed subject was treated for depression at baseline and 2 were treated at 6 months.

To examine change over time, we performed a series of paired t tests comparing baseline with 6-month
This investigation reports the prevalence and impact of depression in this particular population of older persons with bilateral AMD. Its strengths are its prospective design and systematic ascertainment, assessment, and follow-up of subjects whose affective, medical, and functional characteristics were carefully characterized by means of reliable and valid instruments. The study’s limitations are its small size, limited generalizability given the specific inclusion criteria and attrition (which may underestimate the effects of depression), reliance on visual acuity as the sole measure of AMD severity, and the use of a self-reported vision function measure less well validated than the National Eye Institute Visual Function Questionnaire or Activities of Daily Vision Scale.17,18 In fact, our use of a self-report rather than a performance-based measure of vision function cannot control for the potentially confounding effect of depression on self-ratings of function.19

We found high rates of depression at 6 weeks after vision loss in the second eye. The 33% rate exceeds the 16% rate reported in 2 community population studies and is comparable with the 35.2% rate reported in primary care with the use of the same method to diagnose depression.10,19,20 It agrees with Brody and coworkers’ report of a 32.5% prevalence rate of depressive disorder in patients with advanced AMD. Because only 1 subject in this study was receiving treatment for depression at baseline, we suspect that the rate of preexisting depression (before vision loss in the second eye) was extremely low.
Depressed patients had more general and vision-specific disability than nondepressed patients and slightly worse visual acuity, although the correlations between CES-D score and both vision-specific disability and visual acuity were not significant after controlling for general disability. These findings agree with those of others reporting weak or nonsignificant relationships between visual acuity and depression, and others reporting reciprocal relationships between disability and depression in older patients with chronic medical diseases. However, because many nonophthalmologic diseases (eg, cardiovascular disease and cancer) share symptoms with depression (eg, fatigue and anorexia), disentangling their effect on disability has been difficult. Age-related macular degeneration provides a unique disease model to examine these interrelationships because it shares no symptoms with depression. Our longitudinal data suggest that as depressive symptoms increase over time, there is a corresponding decline in vision function occurring independently of change in visual acuity. We found a similar effect when depression was analyzed as the categorical diagnosis of major depression. The current report extends that finding by demonstrating that vision function declines in patients whose depression symptoms increase, regardless of whether they meet criteria for major depression. The psychological and somatic symptoms of depression probably account for its adverse effect on vision function. Discouragement and hopelessness drain inner resolve and resiliency, and anergia, poor appetite, and sleep impair effortful behaviors.

Ophthalmologists are well aware of the emotional consequences of AMD and have been as frustrated in their efforts to respond to depression as they are to restore vision. Unfortunately, many obstacles prevent them from treating depression, such as resource and time constraints and lack of familiarity with treatment indications and psychotropic medications. As a result, depression remains an untreated source of excess disability in many patients. Our findings attest to these disabling effects of depression but also suggest that interventions may be helpful. Recognizing that depression is not simply an understandable consequence of vision loss but rather a distinct, treatable disorder is a necessary first step. Second, ophthalmologists can encourage patients and their families to seek psychiatric care for demoralization and hopelessness, especially if these symptoms persist over time. Third, innovative interventions to prevent or treat depression in specialty eye clinics are possible. We are currently evaluating the efficacy of a psychosocial intervention to prevent depression in older persons with AMD in a randomized, controlled clinical trial funded by the National Institute of Mental Health. Brody et al already demonstrated the efficacy of a brief, behavioral group intervention to improve mood, self-efficacy, and use of vision aids in a similar population. Interventions such as these, as well as others that include education about AMD, increased access to community services, low-vision rehabilitation, support groups, home modifications, and treatment of depression, may ultimately prevent depression and enhance functioning and quality of life. Until treatments to restore vision are available, these approaches provide optimal care to patients with AMD.

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