Improving Diabetic Retinopathy Screening

The article by Gómez-Ulla et al. (1) in this issue of *Diabetes Care* presents a working protocol to alleviate the conundrum of providing appropriate retinal screening to an increasing diabetic population.

Despite more than 40 years of increasingly effective photocoagulation therapy and more than 30 years of advances in vitreous surgical techniques and results, diabetic retinopathy (DR) persists as a major cause of blindness in the 20- to 74-year-old population in all countries.

Despite an increasingly clear understanding of the role of systemic factors in the production and progression of DR, we are still struggling with a major visual health crisis in regard to the prevention of diabetic blindness (2–4).

Despite the improved understanding of the importance of timely diagnosis and therapy of DR, an estimated one-half of the diabetic population does not receive annual dilated examinations. Controversy exists regarding the frequency of retinal examinations for well-controlled type 2 diabetic patients without retinopathy at baseline. Type 2 diabetic patients need a dilated retinal exam at diagnosis. Annual follow-up exams are recommended by the American Diabetes Association and other multiple eye specialty organizations (5,6), yet this follow-up interval can be extended or contracted by consideration of retinal grading and systemic medical factors (5).

Delayed screening postpones the application of both medical and ophthalmologic therapies that are significantly more effective if applied at an appropriate stage of the disease. Treating end-stage diabetic eye complications is very frustrating to the physician and the patient. Late-stage treatments are enormously expensive, technically challenging, and frequently disappointing in terms of restoration of or preservation of vision (6,7).

The explosive growth of the diabetic population demands greater efficiencies in the management of our patients with potential or actual vision threatening conditions. The diabetic population is projected to increase to 300,000,000 by the year 2025 (8). Gómez-Ulla et al. present us with adjunctive methods to alleviate the burdens detecting sight-threatening DR in increasing numbers of diabetic patients.

This well-thought-out system represents an integrative, innovative, efficient, and economical amalgamation of newer technologies to facilitate DR screening. Remote capture, central grading, digital nonmydriatic imaging, and internet methods were used in this study to coordinate three hospitals, three ophthalmologists, and other health care professionals at different locations to more effectively manage diabetic eye complications.

A total of 140 eyes of 70 consecutive, nonselected diabetic patients at two different remote hospitals were studied. Seven eyes were excluded from photography due to the presence of an opaque cataract. Seven eyes were also excluded due to the presence of media opacities or small pupils, which precluded adequate retinal imaging and grading. Four nonmydriatic, nonstereo, standardized digital images per eye were sent via the internet to the reference center, where they were diagnosed and graded by one ophthalmologist. A different ophthalmologist performed a dilated exam at each of the peripheral hospitals. A modified Airlie House system was used for DR grading. The three ophthalmologists independently determined the grade and the presence or absence of DR.

There was 100% agreement between the referral center grading of the internet transmitted images and the two different ophthalmologists diagnosis with direct examination techniques at the peripheral hospitals. DR was not found in 57 eyes (57 of 126, 45%), and DR was diagnosed in 69 eyes (69 of 126, 55%). In the subgroup of the 69 patients with DR, 8 patients were under graded using the digital image–internet system (3 by 1 Airlie House grade, 4 by 2 grades, and 1 by 3 grades). One eye with proliferative DR (PDR) without high-risk complications was diagnosed as moderate nonproliferative DR (NPDR). Four eyes with PDR without high-risk complications were diagnosed as severe NPDR.

Gómez-Ulla et al. have directly addressed several questions in regard to the image capture (number and placement of fields per eye) and also in regard to image transmission, compression, magnification, and security. This new system should help in the management of patients in the peripheral units or in remote areas. This technology is highly amenable to determination of high- versus low-risk DR patients. These high-risk patients should be expedited to the reference center presumably for further evaluation and definitive retinal care as indicated by their retinopathy. The low-risk patient could be reevaluated and followed locally by an eye physician experienced in the management of diabetic retinopathy. This system needs further work for detection of diabetic macular edema. In view of the under-diagnosis of PDR, without high-risk characteristics in five of the six cases, more technological development and experience would seem to be necessary to identify a higher percentage of these PDR patients. At the present time, this system represents a marvelous adjunct to, but not a replacement for, a comprehensive eye exam. I commend the authors on their fine efforts and look forward to more validation studies.

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