Adopting 3-Year Screening Intervals for Sight-Threatening Retinal Vascular Lesions in Type 2 Diabetic Subjects Without Retinopathy

ELISABET AGARDH, MD
POYA TABABAT-KHANI, MD

OBJECTIVE—To report the incidence of sight-threatening vascular lesions in type 2 diabetic subjects without retinopathy after adopting a 3-year interval screening program.

RESEARCH DESIGN AND METHODS—In all, 1,691 type 2 diabetic subjects with no detectable retinopathy in two 50° red-free fundus photographs were scheduled for follow-up with photography 3 years later. Age at diabetes diagnosis was 60 ± 12 years, and known duration of diabetes was 6 ± 6 years. Treatment consisted of diet only (26%), oral agents (54%), and oral agents and/or insulin (20%). Glycated hemoglobin A_{1c} was 6.4 ± 1.5%.

RESULTS—Of the 1,322 subjects available for follow-up, 73% were still without retinopathy after 3 years, and 28% had developed mild or moderate retinopathy, but none developed severe nonproliferative or proliferative retinopathy. Macular edema requiring laser coagulation occurred in only one eye.

CONCLUSIONS—Three-year retinal screening intervals can be recommended in subjects with mild type 2 diabetes and no retinopathy.

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Screening programs for early detection of sight-threatening diabetic retinopathy are highly recommended, but opinions regarding optimal screening intervals differ. In Sweden, biennial screening examinations have long been standard for subjects without retinopathy (1). Since 2006, however, Skåne University Hospital in Malmö has used 3-year screening intervals for type 2 diabetic subjects without retinopathy, as suggested by Younis et al. (2). Here, we describe our prospective study of the 3-year incidence of sight-threatening vascular lesions in that group of patients.

RESEARCH DESIGN AND METHODS

—Type 2 diabetic patients (disease onset at age ≤30 years and no insulin treatment, or onset at age >30 years) with no retinopathy documented in a photographic screening program were registered in a database and scheduled for follow-up 3 years later. A few weeks before the date of the follow-up visit, a notice regarding the time of the appointment was sent to the subject by regular mail. One reminder was sent if a person failed to keep the scheduled appointment.

Red-free digital images of one central and one nasal 50° field per eye were obtained by fundus photography. The International Diabetic Retinopathy and Macula Edema Severity Scales (3) were used for grading, which was performed by specially trained ophthalmic nurses.

Glycated hemoglobin A_{1c} (HbA_{1c}) at baseline and follow-up was analyzed by high-performance liquid chromatography (Varian II Hemoglobin A_{1c} program; BioRad, Hercules, CA), with a normal range of 4.0–5.3%, at Skåne University Hospital, Malmö, which is accredited by the Swedish Board of Confirmatory Assessment.

Statistical calculations were performed using the Student *t* test, or the Mann-Whitney test and the χ^2 test.

The study was conducted in accordance with the Helsinki Declaration and approved by the regional ethical review board in Lund, Sweden.

RESULTS

—Age in this patient cohort was 55 ± 12 years (mean ± SD) at diagnosis and 60 ± 12 years at baseline. The known duration of diabetes was 6 ± 6 years. HbA_{1c} was 6.4 ± 1.5% at baseline and 6.3 ± 1.3% at follow-up. The proportion receiving diet treatment at follow-up had decreased from 26 to 12% ($P < 0.001$), those taking oral agents and/or insulin treatment had increased from 74 to 88% ($P < 0.001$), and subjects taking antihypertensive medication had increased from 56 to 68% ($P < 0.001$). Data were missing on patient characteristics for 2–4% and on HbA_{1c} at baseline and at follow-up for 4 and 7%, respectively.

Of those examined at baseline, 369 did not participate in the 3-year follow-up photography. Patient characteristics and HbA_{1c} levels did not differ in those with and without follow-up data. Compliance was high, and only 9% of the residents in the area who were still alive ignored or refused the follow-up appointment (Fig. 1).

At follow-up, 960 of 1,322 individuals (>70%) were still without retinopathy in either eye, 362 had developed mild or moderate retinopathy, and none showed severe nonproliferative or proliferative retinopathy. Three subjects had signs of macular edema, two in both eyes and one in one eye. Only one of those five eyes required laser treatment. The magnitude of edema in that eye had reduced visual acuity to 0.4, but 4 months after focal laser coagulation, acuity was restored to 0.7. Thus, sight-threatening retinopathy occurred in 5 of 2,644 eyes (0.19%) but

From the Department of Clinical Sciences Malmö, Ophthalmology, Skåne University Hospital Malmö, Lund University, Malmö, Sweden.
Corresponding author: Elisabet Agardh, elisabet.agardh@med.lu.se.
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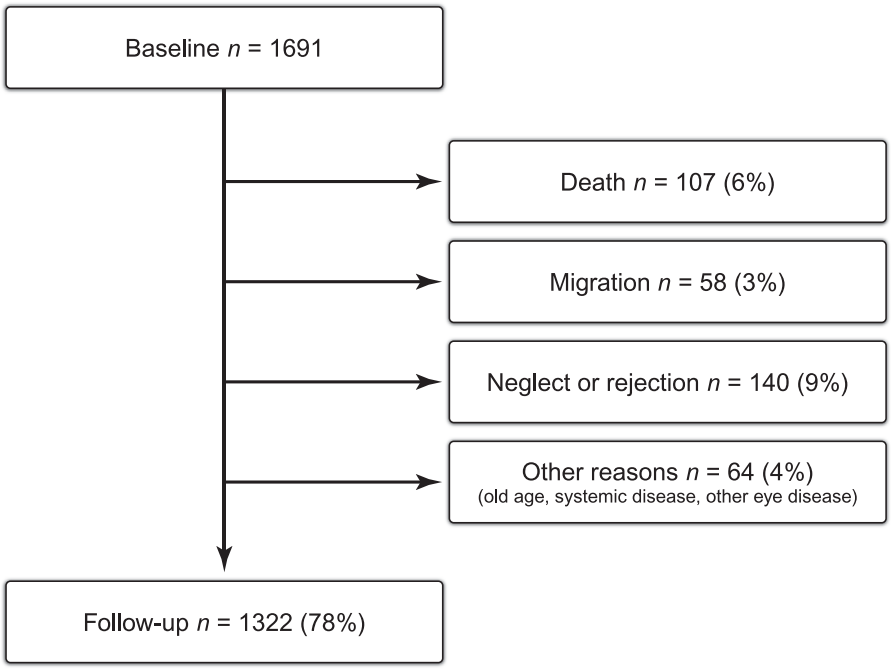

Figure 1—*Numbers of subjects and reasons for dropout.*

affected visual acuity in only 1 eye (0.04%).

CONCLUSIONS—Screening for diabetic retinopathy is highly important for the individual in years of saved vision and for society with respect to costs associated with blindness and visual impairment (4). Many programs recommend yearly screening (5–8), but the optimal interval may differ between groups of diabetic patients. The World Health Organization has lowered the limits for what are considered to be normal reference ranges for blood and plasma glucose levels (9), which has led to the earlier diagnosis of diabetes and has probably also lowered the risk of sight-threatening retinopathy. This might motivate extension of the screening intervals for people with mild diabetes. If the intervals are too long, however, those individuals might be more prone to disregard the examinations, ultimately resulting in lower compliance.

In our cohort, it appeared safe to adopt the 3-year intervals suggested by the Liverpool group (2). The type 2 diabetic subjects without retinopathy had mild diabetes; furthermore, the known duration was short, and metabolic control was good. Only one eye required focal laser treatment for clinically significant macular edema. The screening program was designed to reduce the risk of dropout by notifying patients of scheduled follow-up visits well in advance and by sending reminders if they did not keep the appointments. Compliance was good in this population.

Since 1993, the consensus in Sweden has been to provide regular retinopathy screening at least every 2 years for all diabetic patients, and this strategy was confirmed by the Swedish National Board of Health and Welfare in 1995. Because previous estimates for type 2 patients with diabetes indicated a low risk of progression from no retinopathy to sight-threatening retinopathy (2), in 2010, the Swedish National Board of Health and Welfare changed its general recommendation for screening intervals from 2 to 3 years in this particular group (10). The results of the current study support that advice, but it may be necessary to individualize the intervals for patients with severe diabetes.

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E.A. contributed to discussion and wrote the manuscript. P.T.-K. researched data, contributed to discussion, and reviewed and edited the manuscript.

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