Audit of Diabetic Retinopathy Referrals to Penang Hospital, a Tertiary Ophthalmology Centre in Malaysia

Andrew Keat Eu Lim, Keat Ween Khaw
Ophthalmology Department, Penang Hospital, Penang, Malaysia

Aim: *To describe the demographics of new patients with diabetes referred to the Ophthalmology Department, Penang Hospital, Penang, Malaysia, from July 2005 to December 2005, and to assess the severity of diabetic retinopathy.*
Methods: *Questionnaires were completed by the attending medical officer, based on information gathered from the referral letter, history taking, and examination. The diabetic retinopathy status and treatment administered were recorded.*
Results: *301 patients with diabetes were referred. The mean age was 60.9 years (range, 16 to 85 years). There were 136 men (45.2%) and 165 women (54.8%). The racial demographic was Chinese, 51.5%; Malays, 28.2%; Indians, 19.6%; and others, 0.7%. The mean duration of diabetes before referral was 8.3 years; 201 (66.8%) patients were referred more than 5 years after the diagnosis of diabetes was made. The mean fasting blood glucose level was 9.5 mmol/L. The most common comorbidities were hypertension (60.8%), hyperlipidaemia (17.3%), and renal impairment (6.6%). There was no diabetic retinopathy in 61.1% of patients, non-proliferative diabetic retinopathy in 25.9%, and proliferative diabetic retinopathy in 5.0%. The main reasons for referral were blurred vision (66.4%) and fundus assessment (12.0%).*
Conclusions: *A substantial number of patients had late referral for fundoscopy after the diagnosis of diabetes was made, and one-third of patients already had some form of retinopathy by the time of the referral. Fundoscopy by the referring doctors was inaccurate for nearly half of the patients.*

Key words: *Diabetes mellitus, Diabetic retinopathy, Referral and consultation, Vision screening*

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Introduction

Diabetes mellitus type 2 is becoming a global pandemic with significant costs to health care.[1-3] These costs involves not only the price of diabetic medications but also that of treating the various macrovascular and microvascular complications of diabetes. One of the most feared complications of diabetes is retinopathy. It is a basic medical tenet that all patients with diabetes should have their eyes screened as primary prevention. However, it is unclear as to how well physicians adhere to this principle of primary prevention.

This study aimed to describe the demographics of new patients with diabetes referred to the Ophthalmology Department, Penang Hospital, Penang, Malaysia, from July 2005 to December 2005; assess the diabetic control and severity of diabetic retinopathy (DR) in these patients to illustrate current efforts in screening for retinopathy; and determine the reasons, sources, and accuracies of the referrals.

Correspondence: Dr Andrew Keat Eu Lim, Department of Ophthalmology, Hospital Selayang, Lebuhraya Selayang-Kepong, Batu Caves, Selangor Darul Ehsan 68100, Malaysia.
Tel: (60 19) 457 8939; Fax: (60 3) 6137 7097;
E-mail: akelim@gmail.com

Methods

From July 2005 to December 2005, all patients with type 2 diabetes who were newly referred to the Ophthalmology Department were attended according to the clinic protocol. A questionnaire was completed by the attending medical officer, based on information gathered from the referral letter as well as from the history taking and examination. The patients' eyes were examined and the DR status and treatment administered were recorded.

Results

Patients' Demographics

301 patients with diabetes were referred during the study period. The mean age was 60.9 years (range, 16 to 85 years). There was a slight female predominance with 136 men (45.2%) and 165 women (54.8%). The racial demographic was Chinese, 51.5%; Malays, 28.2%; Indians, 19.6%; and others, 0.7%.

Diabetic Status

The mean duration of known diabetes before referral was 8.3 years; 201 patients (66.8%) were referred more than 5 years after the diagnosis of diabetes was made. The mean fasting blood glucose level was 9.5 mmol/L (reference range, <5.6 mmol/L). Although a more accurate means of determining diabetic control is to measure HbA_{1c}, the majority of patients had not had the test performed by the referring doctor.

Referrals

Most patients were referred from the government outpatient clinics (n = 213; 72%) and the second biggest group of referrals was from government specialist clinics (n = 64; 21%). The main reason for referral was blurring of vision (n = 200; 66.4%). Seventy two of the patients with blurred vision (36.0%) had significant cataract requiring surgery, 5 (2.5%) had age-related macular degeneration, and 2 (1.0%) had glaucoma. Seventy two patients with blurred vision (36.0%) had DR, of whom 22 (11.0%) had proliferative DR (PDR), and 26 (13.0%) had maculopathy; 39 (54.2%) of whom required treatment (laser or vitrectomy). Thirty six referrals (12.0%) were for fundus assessment and 31 (10.3%) were because DR was noted by the referring doctor, although 13 of these patients (41.9%) did not have any diabetic changes when reviewed by the ophthalmology medical officer. This finding was counter-checked by the ophthalmology specialist to ensure that there were no errors.

Systemic comorbidities were documented: 183 patients (60.8%) had hypertension, 52 (17.3%) had hyperlipidaemia, 20 (6.6%) had renal impairment, 4 (1.3%) had peripheral neuropathy, 56 (18.6%) had ischaemic heart disease, 11 (3.7%) had a previous stroke, 3 (1.0%) had peripheral vascular diseases, and 5 (1.7%) had diabetic foot ulcer.

Diabetic Retinopathy Status

184 patients (61.1%) had no DR; 78 (25.9%) had non-PDR (NPDR); 15 (5.0%) had PDR, 18 (6.0%) had advanced DR (vitreous haemorrhage and tractional retinal detachment), and 6 (2.0%) had no vision because of cloudy media. Thirty five patients (11.6%) had maculopathy. Thirty nine patients (13%) had potentially sight-threatening retinopathy requiring close monitoring and treatment (severe NPDR, PDR, or advanced DR). Of the patients with maculopathy, 11% had clinically significant macular oedema requiring laser treatment.

Of the 301 newly referred diabetic patients, 54 (17.9%) required treatment of either laser or vitrectomy.

There was no statistically significant correlation between the presence of comorbidities such as hypertension or hyperlipidaemia with severity of DR or with macular oedema. However, there was insufficient information on the control of comorbidities to perform statistical analysis against the severity of DR.

Discussion

More women than men with diabetes were referred to the ophthalmology department. This may represent better health seeking behaviour of women. There was a predominance of Chinese patients, followed by Malays and Indians, which roughly represents the population ratio of Penang Island.

Although the American Academy of Ophthalmology recommendation is for fundoscopy at the time of diagnosis of type 2 diabetes mellitus,[4] the average duration between the patient having a diagnosis of diabetes and the first fundus screening was 8.3 years. In addition, the average blood sugar was 9.5 mM, whereas the limit recommended by the International Diabetes Federation is 6.0 mM.[5] Finally, HbA_{1c} was not performed routinely to monitor control of diabetes. The combination of late screening, poor control, and poor monitoring of control will result in a detrimental outcome for patients in terms of DR.

As Penang Hospital is government sponsored, it is not unusual that the majority of referrals were from government-sponsored outpatient clinics. This raises the question of whether patients are being optimally managed at the outpatient clinics, given that fundoscopy was not performed at diagnosis, and glycaemic control and monitoring of glycaemic control was poor. It is also interesting that 66.4% of patients were referred for blurring of vision. If the patients had not had this visual symptom, it is unlikely that they would have been referred for fundoscopy. Screening fundoscopy implies that fundoscopy should be performed prior to development of symptoms, when the vision is still good. Most patients with blurring of vision had severe cataract (n = 72; 36%), which is not unusual given the mean age of 60.9 years. However, cataracts in this group of patients may also be diabetes-related.

It is interesting that of the patients referred because fundoscopy performed by the referring doctor showed DR changes, 41.9% (overall 4.3% of all patients) did not have DR. Fundoscopy using the direct ophthalmoscope is not easy, especially if it is not regularly performed. Furthermore, the retina will be difficult to examine if the pupils are not dilated. This will be harder if the patient has some form of media opacity such as cataract. This suggests that although screening fundoscopy can be performed by a primary physician or medical officer, the quality of the test will be in doubt. The medical officer must first be adequately trained and a proper dark room prepared for fundoscopy. Dilating eye drops must always be available and the patients warned that their vision will be impaired temporarily when their pupils are dilated and they will need a companion to take them home as driving

will not be possible. To improve the screening process without burdening ophthalmologists, a non-mydriatic camera can be used to take fundus pictures in the outpatient department, which can be reviewed by an appointed ophthalmologist at a later time. The pupils need not be dilated, thereby saving time, money, and discomfort to the patient. A report by the American Academy of Ophthalmology on fundus photography for DR screening concluded that the advantages include ease of use (only 1 photograph is required), convenience, and ability to detect DR.[6] Furthermore, family physicians have been found to be fairly accurate at screening for DR using a non-mydriatic camera, eliminating the need for an ophthalmologist, thus saving time for treating other ocular diseases.[7] In the future, computers are likely to replace ophthalmologists in screening for DR as automated identification of DR is already a possibility today, although this is not yet not commercially available.[8]

Of the patients with comorbidities, 60.8% had hypertension and 17.3% had hyperlipidaemia, which represents an association with diabetes in the metabolic syndrome.

Seventy two patients (36.0%) already had some form of retinopathy at the time of referral. Thirteen percent of referred patients had sight-threatening DR (severe NPDR, PDR, or advanced DR) and 17.9% required some form of ophthalmological intervention such as laser or surgery. With 36.0% of patients requiring cataract surgery, potentially half of those patients referred to the ophthalmology department required some intervention. It is important that the idea of primary prevention for diabetic complications be enforced in the primary treatment setting and that the eyes of patients with diabetes are checked before development of symptoms.

A considerable number of patients with type 2 diabetes mellitus referred to the ophthalmology clinic had fundoscopy delayed for several years following the diagnosis of diabetes. One-third of referred patients already had some form of DR at the time of referral. Fundoscopy performed by the referring doctors were inaccurate in nearly 50% of referrals. One means of improving screening for DR may be to use a non-mydriatic camera in the outpatient clinics.

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