VALUE OF FLUORESCEIN ANGIOGRAPHY IN THE DIAGNOSIS QF DIABETIC MACULOPATHY

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Introduction

Diabetic retinopathy is the commonest and most widely known form of microangiopathy and is one of the important causes of visual impairment. As a result of microangiopathy multiple foci of tissue hypoxia develop in the retina leading to increased permeability of the capillaries and the resultant formation of micro-aneurysms, haemorrhages and exudates. The hypoxic stimulus also leads to formation of new blood vessels.[1]

Macula, being avascular, does not become the centre of a primary hypoxic focus but can secondarily be affected by the presence of a hypoxic focus in its vicinity. The macula can be affected in various ways[1]-oedema, new vessel formation, haemorrhages or, exudates. The first sign of diabetic maculopathy is macular oedema but eventually sensory and pigment epithelial degeneration will take place with failing visual acuity. Any therapeutic interference to be effective will have to be early. Ophthalmoscopy and conventional retinal photography have their limitations in detecting early changes of retinopathy and maculopathy. Fluorescein angiography is an easily available, simple and safe procedure by which the dynamic state of retinal circulation can be assessed and recorded permanently.

This paper deals with the work that was undertaken to study the incidence and features of diabetic maculopathy using fluorescein angiography in diabetic patients found to have diabetic retinopathy on ophthalmoscopic examination. An attempt has been made to correlate the severity of maculopathy with the age, sex, type and duration of diabetes.

Patients and methods

72 eyes from 36 patients with diabetes mellitus in whom both eyes showed evidence of diabetic retinopathy on ophthalmoscopy formed the material for this study. Clear ocular media and absence of fundal changes due to other disease were the other criteria in selection of patients.

A detailed history, clinical examination and laboratory work up was first carried out to elucidate the type of diabetes mellitus, its duration and severity.

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Ocular examination included visual testing, measurement of intraocular pressure and a detailed fundus examination to bring out changes both in the macular area as well as the background retina. After taking photographs of the macula and the retina, 5 ml of 10% Na fluorescein was injected intravenously and serial photographs were taken for upto three minutes and then again after 5 minutes. The photographs were studied in detail to assess the background retinopathy as well as the macular changes. The maculopathy was classified using Vink and Nieuwenheves Koster's method.

Observations

The age and sex of the patients studied is given in Table-l. 30 of the 36 patients had NIDDM and the majority were in the 5th decade. The remaining 6 patients had IDDM and were younger (2nd and 3rd decade). The sex incidence was almost equal.

Table I

Age, Sex and Type of Diabetes Mellitus

Age (years)	Type of Diabetes Mellitus				
	IDDM	NIDDM	Total	Male	Female
21-30	4	-	4	1	3
31-40	2	-	2	1	1
41-50	-	4	4	2	2
51-60	-	22	22	12	10
61-70	-	4	4	3	1
Total	6	30	36	19	17

The duration of diabetes mellitus (Table-II) varied from 7-21 years. The average duration was 10.4 years in NIDDM and 15.8 years in IDDM.

Table II

Duration of Diabetes Mellitus

Duration (years)	IDDM	NIDDM	Total	Percentage
< 5	-	-	Nil	-
5-10	-	17	17	47.2
11-20	5	13	18	50.0
>20	1	-	1	2.8

On ophthalmoscopy out of 72 eyes, 62 (86.1%) showed evidence of simple retinopathy and 10 (13.9%) proliferative changes. Fluorescein angiography helped to delineate the different types of background retinopathy - microaneurysms were present in almost every case, ischaemic foci was the next and in common finding.

Maculopathy could be diagnosed on ophthalmoscopy in 28 aut of 72 eyes studied and in an additional 10 eyes it was brought out by fluorescein angiography. Thus 38 of the 72 eyes (52.8%) with diabetic retinopathy had either ophthalmoscopic or angiographic evidence of maculopathy. The details of the nuclear lesions found on angiography are given in Tahle-III.

Tahle III

Type of lesion on Fluorescein Angiography

Lesion	No.	Percentage
Microaneurysm	38	100.0
Macular Oedema	32	84.2
Ischaemic foci	32	84.2
Dot & blot haemorrhages	26	68.4
Hard exudates	24	63.1
Extensive Haemorrhages	8	21.0
Soft exudates	8	21.0
Neovascularisation	12	31.6

Applying Vink and Nieuwenkeves Koster's criteria for classification of the severity of maculopathy, 34 eyes (47.2%) were of stage 0, that is, there was no evidence of maculopathy even on angiography. Out of the 38 eyes diagnosed to have maculopathy, 16 eyes (42. 1 %) were in stage-I, 10 eyes (26.3%) in stage-II and the remaining 12 eyes (31.6%) in stage-III.

Age of the patients with maculopathy varied from 28 to 70 years. The average age in NIDDM was 60.1 years and IDDM, 32.3 years. There was no significant sex difference but the number of females exhibiting stage-III changes (8) was twice the number of males (4) with similar changes. The duration of diabetes in patients with diabetic maculopathy ranged from 8-18 years in NIDDM (mean 12.7 years) and 16-21 years in IDDM (mean 18.7 years).

Discussion

Several distinct pathological processes may singly or in combination interfere with macular function in patients with diabetic retinopathy. The choice of appropriate therapy and the determination of visual prognosis depend upon an accurate diagnosis[4]. The advent of fluorescein angiography has helped not only in the earlier diagnosis of maculopathy but also in determining the prognosis5 and in evaluation of different types of therapy[6].

In the present study out of the 72 eyes with ophthalmological evidence of retinopathy that were studied, as many as 38 eyes (52.8%) showed evidence of maculopathy-10 of them being detected only by angiography. This incidence of maculopathy is higher than that reported by McMeel et al[7] who in a large series of 1,837 cases, reported an incidence of 23%. This difference is probably due to the bias in patient selection and the advanced cases of retinopathy that were studied by us. The mean age of the diabetics with maculopathy was 60.1 years in NIDDM and 32.3 years in IDDM and this is in conformity with that reported by others. The duration of diabetes was 12.7 years in NIDDM and 18.7 years in IDDM which is also in keeping with the finding of others[8,9]. On the whole, diabetic maculopathy is much more common in NIDDM but can also occur in IDDM[10,11].

Of the associated retinopathic lesions, proliferative retinopathy was found in 12 of the 72 eyes (31.6%). The other 60 eyes had various types of background retinopathy. Microaneurysms (100%), macular oedema (84.2%) and ischaemic foci (84.2%) were the commonest lesions. The severity of the macular changes did not necessarily correspond to the severity of retinopathy in general. Maculopathy however tended to be more severe in female patients though there was no sex difference in the incidence.

Summary

Maculopathy is an important subset of diabetic retinopathy and accounts for considerable impairment of central vision. Fluorescein angiography has come as an additional tool in the investigation of these cases. 72 eyes from 36 diabetics who had evidence of diabetic retinopathy in both eyes on ophthalmoscopy were taken up for this study. After fluorescein angiography the macular involvement was analysed in detail and the results are presented. It is concluded that fluorescein angiography helps not only in earlier diagnosis but also in delineating the type and extent of the lesion and in assessing its severity and prognosis.

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