Research Paper

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Fluorescein Angiography Changes in Background Diabetic Retinopathy

Medical Science

KEYWORDS : Fundus fluoresceine angiography, Background diabetic retinopathy, ophthalmoscopy

Dr. R. S. Umadevi — Associate Professor, Department of Ophthalmology, Kempegowda Institute Of Medical Sciences, K.R.Road, V. V.Puram, Bangalore- 560004, Karnataka, India.

Dr. Mona Gautam — P.G, Department of Ophthalmology, Kempegowda Institute Of Medical Sciences, V V Puram, Bangalore- 560004, Karnataka, India.

ABSTRACT

Introduction:Over the past 40 years since its introduction Fluorescein Angiography (FA) has found wide application in modern ophthalmology. Diabetes affects the circulatory system of retina. The early phase of the disease is known as background diabetic retinopathy (DR). The study was aimed to evaluated the state of background DR by FA in order to facilitate early diagnosis and prevention of further complication to retain better vision.

Materials and method: The study was carried out at the Department of Ophthalmology, KIMS Bangalore. 50 eyes of 25 patients with non-insulin dependent diabetic retinopathy were studied.

Results:Out of 50 subjects 20 were males and 30 were females. The FA pictures were compared with ophthalmoscopic findings in all cases. Micoraneurysyms were seen in all cases by FA whereas only 35 cases were detected by ophthalmoscopic findings. 4 cases of ischaemicmaculopathy were detected by FA which were not detected by ophthalmoscope.

Conclusion:FA helps us to a great extent in evaluating DR particularly maculopathy and plan the treatment and assess the prognosis. Even the number and extent of microaneurysm can be appreciated by FA. So clinically significant macular oedema can be confirmed by FA and it can be treated with photo coagulation.

Introduction:

Over the past 40 years, since its introduction, fluorescein angiography has found a wide application in modern ophthalmology. Fluorescien has been used since the beginning of the century to study the retinal and choroidal circulation and fundus pathology.In 1910 Bark described his studies of human fundus, following oral administration of fluorescein. The first fluorescein angiogram in human was used by Novotny and Alvis in 1961[1]. Diabetes affects the circulatory system of the retina. The earliest phase of the disease is known as background diabetic retinopathy. The study was aimed to evaluate the state of background diabetic retinopathy by fluorescein angiography in order to facilitate the early diagnosis and prevention of further complication of diabetic retinopathy to enable patient to retain better vision and safeguard it. Ischemia of the macula and early proliferative changes can be detected by fluorescein angiography which can be missed normally in routine ophthalmic evaluation. It also helps to plan the photocoagulation treatment of retina. Non perfusion areas can be detected which are common sites of retinal neovascularization.

Materials and methods:

The study was carried out at the department of ophthalmology, Kempegowda institute of medical sciences and research centre, Bangalore .The total number of cases studied was 50 eyes of 25 patients. Patients attending the out patient department were selected for above study and all belonged to NIDDM group. Patients having as clear media as possible were selected, as angiographic pattern is difficult to observe in hazy media like lens opacities.Patients with previous mild reaction to fluorescein, moderate to severe asthma with poor control, recent stroke, myocardial infarction or unstable angina, Pregnancy and lactation were excluded from the study.

Patients were first examined by physician regarding all systems especially cardiovascular , respiratory , central nervous system and per abdomen. ECG was taken and also FBS, PPBS,urine examination for sugar was done. patients pronounced fit were selected.After a detailed fundus exam by dilating pupil with tropicamide 0.8% plus phenylephrine 5% eye drops instilled, patient was made to sit in front of the fundus camera and was prepared to take photographs. First a plain color fundus photo was taken, procedure was explained to the patient, and was asked to look in whatever direction he is directed to. 5ml of 10% sodium fluorescein was injected rapidly into the vein. The fundus was focussed and then photographs were taken as soon the dye appeared in fundus starting from choroidal and early arterial phase to late venous phase.Iiford 400,Black and white film was used . during procedure patient's pulse and general condition was watched, and any reaction attended to it.After this the patient was made to lie down for 10 – 15 minutes and explained about general consequences of fluorescein angiography and observed.

Results:

Out of 50 subjects 20(40%) of them are males and 30(60%) are females. Out of 20 males (20%) of them are in the age group of 40-45 years , 4(40%) are in the age group 50-55 years,1(10%) are in the age group of 55-60 years and the remaining 3(30%) subjects are above 60 years.Out of 15 females 4(26.67%) 0f them are in the age group of 45-50 years, 7(46.67%) are in the age group of 50- 55 years. 1(6.66%) are in the age group of 55-60 years and the remaining 3(20%) subjects are above the age of 60 years.The flourescein angiographic pictures were compared with the ophthalmoscopic findings in all the 50 patients and recorded.

Microaneurysms were seen in all the cases by flourescein angiography whereas only 35 cases were detected by ophthalmoscopic findings. Angiography also helped to differentiate between the micro aneurysm and small sized deep haemorrhages.

Haemorrhages were present in all the cases by ophthalmoscope. This ranged from small dot haemorrhages to medium sized deep haemorrhages. These areas were also seen in all 50 patients as block flourescene in the angiogram. Venous dilatation were seen in all the cases by both methods.

22cases of maculopathy were seen in this study by both methods with 18 cases of exudative maculopathy. 4 cases of ischaemicmaculopathy were detected only in FFA which were not detected by ophthalmoscope.

Discussion:

Micro angiopathy is observed as a loss of the peri-foveal vasculature and the accompanying enlargement of the central avascular zone[2,3,4]. Accordingly, many studies have used foveal avascular zone(FAZ) size as an indicator of the extent of ischaemic maculopathy in diabetes.Bresnick et al. reported a significant enlargement of the FAZ in patients with diabetic retinopathy compared with controls and found a strong correlation between the size of the FAZ and theseverity of nonperfusion in the posterior retina, indicating that angiographic delineation of the FAZ is highly relevant in the assessment and management of diabetic eye disease[5].A study made by Harding et. al. suggested that screening of diabetic retinopathy prevents blindness but

because of inadequacies of current screening programs, many diabetic patients never receive treatment before developing severe visual loss.Several alternative screening methods exist like direct ophthalmoscopy, various methods of fundus photography, slit lamp biomicroscopy and FFA.

In diabetic retinopathy the FFA is useful in identifying the extent of ischemia, the location of micro aneurysms, the presence of intraretinal microvascular abnormalities (IRMA) that can only be confirmed on angiogram, noevascularization and the extent of macular edema. FFA is not only useful for diagnosis but also to gauge the progression and management of diabetic retinopathy(DR). FFA is a therapeutic guide to laser photocoagulation treatment for several retinal vascular diseases. Clinical investigation of DR are necessary using fundus photographs and flourescein angiograms. Even when done by highly trained examiners, such as the retina specialist in this study, the scanning technique of ophthalmoscopy is not sensitive enough to find rare microaneurysms reliably.Approximately 50% of subjects with only microaneurysms are missed using ophthalmoscopy, resulting in underreporting of diabetic retinopathy prevalence rates by approximately 10%[6].

Philip & Coworkers believed this technique is sufficiently sensitive and robust for clinical use. FFA confirms a presumed diagnosis, determines the course of treatment and documents the finding that may change over time[7].Shetty K J et al. showed in his study of 72 eyes from 36 diabetics who had evidence of diabetic retinopathy in both eyes, 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[8].Some of the changes occurring in the retina due to diabetes mellitus are made out by fluorescein angiography than on ophthalmoscopicevaluation. In our study,areas of leaks from microaneurysms, hyperfluorescence and hypofluorescence were studied.Microaneurysms especially outnumbered that seen ophthalmoscopically.It was easy to differentiate the microaneurysms from deep haemorrhages. Predominantly they were arranged around the areas of capillary non perfusion. The areas of ischemia in the macular area could be accurately delineated by the angiogram. This forms an important factor in assessing the severity of the pathology in the macula because inadequate blood supply affects vision to a great extent. Areas of leaks from the microaneurysms form the most important finding to judge the treatment aspect of these patients . In our study,microaneurysms were seen in all the cases by flourescein angiography whereas only 35 cases were detected by ophthalmoscopic findings. Angiography also helped to differentiate between the micro aneurysm and small sized deep haemorrhages. 22 cases of maculopathy were seen in this study by both methods with 18 cases of exudative maculopathy 4 cases of ischaemic maculopathy were detected only in FFA which were not detected by ophthalmoscope. So clinically significant macular oedema can be confirmed by fluorescein angiography and treated with photocoagulation. Ischemic maculopathy causing macular oedema can be differentiated from exudative.

Focal and diffuse leaks can be mapped by fluorescein angiography.Even the number and extent of microaneurysms can be appreciated by fluorescein angiography.

Developing Countries. jan-april 1987; 07: 56-60.

S. No.	Lesion	Ophthalmoscopy	Fluorescein angiography
1	Microaneurysm	35 (70%)	50 (100%)
2	Maculopathy	22 (44%)	22 (44%)
3	Exudative maculopathy	18 (36%)	18(36%)
4	Inchaemicmaculopathy	0	4 (8%)
5	Haemorrhages (both dot and blot and deep haemorrhage)	50 (100%)	50 (100%)

Table 1-Type of lesions on ophthalmoscopy and fluorescein angiography .



Fig.1 – Ophthalmoscopic findings in Background Diabetic Retinopathy(Left eye)

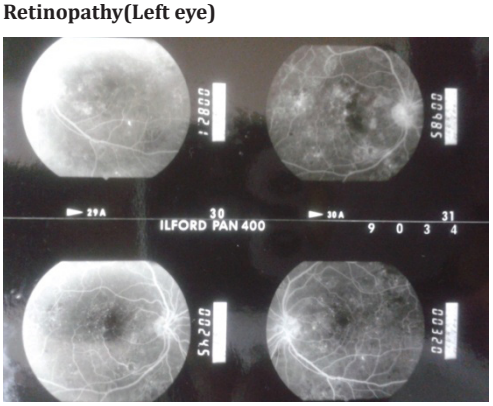


Fig.2- Background Diabetic Retinopathy with ischaemic-maculopathy (both eyes)in FFA.

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