

Role of Systemic Risk Factors in Diabetic Macular Edema in Type 2

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Abstract:

Purpose: To determine role of systemic risk factors in focal and diffuse macular edema

Methods: Total of 86 patients of type 2 diabetes with retinopathy were studied during Aug12 to Sept 2014. All were evaluated for maculopathy by slit lamp biomicroscopy and fluorescein angiography. Systemic control is evaluated with clinical examination and laboratory investigations

Result: of 172 eyes, 62.8% had NPDR, 37.8% had PDR. CSME was seen in 52.9%

Angiographically, macular oedema was classified upon no leakage in 33.74%, focal in 18.6%, diffuse in 31.39%, ischemic maculopathy in 16.27%

Conclusion: In present study we found that the association between HbA1c (p-0.0283) and CAD (p- 0.0405) with focal macular edema that is statistically significant .

Keywords: Angiography, Diabetic Retinopathy, hypertension

I. Introduction

Diabetic macular edema is the leading cause of blindness in diabetic patients. DME occurs after breakdown of the blood-retinal barrier because of leakage of dilated hyper permeable capillaries and microaneurysms. It is categorized as Diffuse - presents area of capillary non perfusion with or without cystic changes. Focal -leakage from specific capillary lesion. Concomitant systemic diseases are known to aggravate DR. We designed to study a correlation between DME and selected systemic diseases like hypertension, renal disease, anemia and hyperlipidaemia, hyperglycemia, ischemic heart disease. These diseases were selected because of their known effects on diabetic retinopathy, similar microangiopathy.

II. Material And Methods

Study Design

It was a hospital based observational study, conducted between August 2012 and September 2014 and included:

Inclusion Criteria

1. Presence of retinopathy attributable to type 2 diabetes mellitus.
2. Patients able and willing to give informed consent to participate in the study.

Exclusion Criteria

1. Patients of Type 1 diabetes mellitus; gestational diabetes
2. FFA not possible either due to medical reasons or refusals
3. Hazy ocular media precluding a good view of the retina
4. Patients of on haemodialysis or peritoneal dialysis
5. Patients on insulin treatment

III. Clinically Significant Macular Edema – (As Defined By Etdrs).

CSME was defined upon slit lamp biomicroscopy as -

- (1) Thickening of the retina at or within 500 µm of the center of the macula
- (2) Hard exudates at or within 500 µm of the center of the macula associated with thickening of adjacent retina
- (3) A zone of retinal thickening 1 disc area or larger, any part of which is within 1 disc diameter of the center of the macula

1. Fundus fluorescein angiography (FFA).

Fundus fluorescein angiography – All patients included in the present study underwent FFA.. Assessment of macular perfusion and FAZ was done using frames centered on the fovea showing the highest quality capillary phase.

2. **Fundus photographs** were taken using TOPCON 50Dx fundus camera to keep record.

Angiographically Diabetic Maculopathy was further classified as:

Focal macular edema was defined as focal areas of retinal thickening observed through biomicroscopy of posterior pole with flat lens and stereo fundus photograph and characterized by intraretinal angiographic leakage predominantly from foci of microaneurysms in the macular area.

Diffuse macular edema was defined as presence of retinal thickening involving the entire macula, identified by biomicroscopy of the posterior pole and stereo fundus photographs and Angiographically characterized by intraretinal leakage from dilated capillary bed throughout the posterior pole, with or without cystoids macular edema. We categorized all patients examined into two groups on the basis of macular perfusion, namely focal group and diffuse group. Systemic factors were studied and the two groups were compared for association of risk factors.

IV. Investigations-

For study purposes, criteria used for diagnosis of diabetes and various systemic conditions are as follows:

1. **Diabetes mellitus** Blood Sugar: (F) -126 mg/dL (PP)-200 mg/dL or On treatment
2. **Type 2 diabetes mellitus** -diagnosed after the age of 40 years
3. **Blood pressure** Systemic hypertension >140 mm Hg
Diastolic blood pressure >90 mm Hg, or On systemic antihypertensive medications.
4. **IHD** based on evidence of previous myocardial infarction or ischemic changes (elevation/depression of S-T segment, inversion of T-wave) on ECG supported by clinical history and/or echocardiogram, or a history of cardiovascular surgery or angioplasty for IHD.
5. **Hyperlipidaemia** - fasting total plasma cholesterol of > 200 mg/dL
6. **Nephropathy**- Urine albumin > 1+ (30 mg/dL, indicating gross proteinuria)
and/or Blood urea > 40 mg /dL
and/or Serum creatinine >1.5 mg/dL
7. **Anemia** - hemoglobin < 12gm/dl in females and < 13gm/dl

V. Statistical Analysis

Data is analyzed on graph pad prism for windows. Comparison of two groups that is ischemic and non ischemic group was done and statistical significance was tested using Chi square test. P value less than 0.05 was considered to be statistical significant.

Observations

In our study, a total of 250 cases of type 2 DM were examined. Of these, only 86 patients showed clinical evidence of diabetic retinopathy on ophthalmoscopy. So the prevalence of DR in our study was 34.4%.

Table 1- Incidence Of Csme

S. No.		EYES	
		NUMBER (n)	PERCENTAGE (%)
1.	CSME	91	52.90%
2.	NON CSME	81	47.09%
	TOTAL	172	100%

Table 2- Classification Of Diabetic Macular Edema On The Basis Of Ffa

S. No.	TYPE OF LEAKAGE ON ANGIOGRAPHY	NUMBER	PERCENTAGE
1.	NO LEAKAGE	29	33.74%
2.	FOCAL	16	18.6 %
3.	DIFFUSE	27	31.39 %
4.	ISCHEMIC MACULOPATHY	14	16.27%

Table -4 Association Of Diffuse Maculopathy With Systemic Factors

SR. NO	SYSTEMIC FACTORS	DIFFUSE MACULOPATHY	NONDIFFUSE MACULOPATHY	CHI-SQUARE	P-VALUE
1	HTN	20	36	1.390	0.2384
2	Hyperlipidaemia	10	13	2.128	0.1446
3	Nephropathy	6	13	.03817	0.9844
4	Anaemia	17	31	.8156	0.3665
5	HbA1c	11	26	.08364	0.7724
6	CAD	1	5	.6496	0.4202
7	Stroke	0	3	1.432	0.2330
8	PVD	2	3	0.1825	0.6692

Table -5 Association Of Focal Maculopathy With Systemic Factors

SR. NO	SYSTEMIC FACTORS	FOCAL MACULOPATHY	NON FOCAL MACULOPATHY	CHI-SQUARE	P VALUE
1	HTN	10	46	0.9874	0.3204
2	Hyperlipidaemia	2	21	2.036	0.1536
3	Nephropathy	3	19	.1336	0.7147
4	Anemia	8	37	.4262	0.8364
5	HbA1c	11	27	4.809	0.0283*
6	CAD	3	3	4.198	0.0405*
7	Stroke	1	2	0.4453	0.5046
8	PVD	0	5	1.213	0.2707

VI. Discussion

The goal of the present study was to determine systemic factors that may be associated with an increased risk of focal macular edema in DR patients compared with patients having diffuse macular edema.

Prevalence Of Clinically Significant Macular Edema In Dr

In our study, 52.90% of patients of diabetic retinopathy had clinically significant macular edema, which is similar to study by Eckhard Zander et al (2000) who found 53% patients with CSME. Romero-Aroca P et al reports prevalence of diabetic macular edema 7.15% in 1993 and 7.86% in 2006 in Type 2 patients.

Angiographic Classification Of Diabetic Macular Edema

Our study shows that on angiography Focal leakage was seen in 18.6% of patients and diffuse leakage in 31.39% of patients. Prevalence of ischemic maculopathy in present study was 16.27%. Jacqueline M. et al reports in 94 adult-onset DM patients, the frequency of diffuse macular edema (55.5%) was significantly higher than focal (23.0%) or no macular edema (21.0%) at the time of examination that is similar to our study.

Systemic Risk Factors In Focal Macular Edema .

In our study we found that systemic risk factors of poor glycaemic control and coronary artery disease were positively associated with focal macular edema. HbA1c (p-0.0283) and CAD (p- 0.0405). There were no association between hyperlipidaemia, anemia, nephropathy, hypertension with focal macular edema.

Systemic Risk Factors In Diffuse Macular Edema

in our study there is no positive correlation between systemic risk factor and diffuse macular edema. however Jacqueline M et al reports The prevalence of high blood pressure was 71.0% (38/53) among patients with diffuse macular edema, that was statistically significant

VII. Conclusion And Summary

Diabetic macular edema is an important cause of visual impairment in patients with diabetic retinopathy. DMI is characterized by breakdown of the blood-retinal barrier because of leakage of dilated hyper permeable capillaries and microaneurysms. After applying inclusion and exclusion criteria's, out of 250 patients examined ophthalmoscopically, 86 patients with confirmed diagnosis of diabetic retinopathy (any grade), attributable to type 2 diabetes mellitus were included in our study

At the completion of study, data was analyzed and following conclusions were drawn-

- The prevalence of DR in our study was 34.4%.
- Total of 172 eyes of 86 patients were examined and severity of retinopathy was graded according to the abbreviated ETDRS classification.
- NPDR was seen in 62.2% of eyes amongst whom, moderate NPDR was most common (36.04%). PDR was seen in 37.8% of eyes.
- Clinically significant macular edema was seen in 52.90% of eyes in the present study.
- Angiographically diabetic maculopathy was further classified in focal, diffuse, ischemic categories on the basis of macular perfusion.
- Focal leakage was seen in 18.6% of patients, diffuse leakage in 31.39% and ischemic maculopathy in 16.27% of patients.
- 33.74% patients had no leakage on fundus fluorescein angiography.
- Various systemic risk factors like hyperglycaemia, hyperlipidaemia, hypertension, nephropathy, ischemic heart disease, stroke, peripheral vascular disease were studied in all patients.
- We did not get any positive correlation between systemic risk factor studied and diffuse macular edema.

- In present study we found that the association between HbA1c (p=0.0283) and CAD (p= 0.0405) with focal macular edema that is statistically significant .

Reference

- [1]. Aiello LP, Cahill MT, Wong JS. Perspective: Systemic considerations in the management of diabetic retinopathy. *Am J Ophthalmol* 2001; 132:760-76.
- [2]. Fong DS, Ferris FL III, Davis MD, Chew EY:For the Early Treatment Diabetic Retinopathy Study research group. Causes of severe visual loss in the early treatment diabetic retinopathy study: ETDRS Report 24. *Am J Ophthalmol* 1999;127:137-41.
- [3]. Early Treatment Diabetic Retinopathy Study Research Group. Focal photocoagulation treatment of diabetic macular edema. Relationship of treatment effect to fluorescein angiographic and other retinal characteristics at baseline: ETDRS Report 19. *Arch Ophthalmol* 1995;113:1144-55.
- [4]. Bresnick GH, Condit R, Syrjala S, Palta M, Groo A, Korth K. Abnormalities of the foveal avascular zone in diabetic retinopathy. *Arch Ophthalmol* 1984;102:1286-93.
- [5]. Mansour AM, Schachat A, Bodiford G, Haymond R. Foveal avascular zone in diabetes mellitus. *Retina* 1993;13:125-28.
- [6]. Shukla D, Kolluru CM, Singh J, John RK, Soman M, Gandhi B, Kim R, Perumalsamy N. Macular ischaemia as a marker for nephropathy in diabetic retinopathy. *Indian J Ophthalmol* 2004;52:205-10.
- [7]. Klein R, Sharrett AR, Klein BEK, Moss SE, Folsom AR, Wong TY et al. The association of atherosclerosis, vascular risk factors, and retinopathy in adults with diabetes. The Atherosclerosis risk in communities study. *Ophthalmology*2002;109:1225-34.
- [8]. Hiller R, Sperduto RD, Podgor MJ, Ferris FL 3rd, Wilson PW :Diabetic retinopathy and cardiovascular disease in type II diabetics. The Framingham Heart Study and the Framingham Eye Study
- [9]. Kahn, H. A., H. M. Leibowitz, J. P. Ganley, M. M. Kini, T. Colton, R. S. Nickerson and T. R. Dawber: The Framingham Eye Study. I. Outline and major prevalence findings. *Am J Epidemiol* 106:17–32, 1977.
- [10]. Kahn HA & Hiller R (1974): Blindness caused by diabetic retinopathy. *Am J Ophthalmol* 78: 58–67 .
- [11]. Ronald Klein, A.Richey Sharrett,Barbara E.K Klein,Scot E Moss, Aaron R Folsom,Tien Y Wong, Frederick L Brancati,Larry D Hubbard ,David Couper: The association of atherosclerosis, vascular risk factors, and retinopathy in adults with DIABETES OPTHALMOLOGY VOLUME 109, ISSUE 7 , PAGES 1225-1234, JULY 2002
- [12]. Romero P, Baget M, Mendez I, Fernández J, Salvat M, Martinez I. Diabetic macular edema and its relationship to renal microangiopathy: a sample of Type I diabetes mellitus patients in a 15-year follow-up study.*J Diabetes Complications*. 2007 May-Jun;21(3):172-80.