Research Paper

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A Study Of Diabetic Ischemic Maculopathy and its association with systemic risk factors

Medical Science

KEYWORDS : Diabetes Mellitus, Type 2, , Diabetic Nephropathies, Diabetic Retinopathy

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ABSTRACT

PURPOSE-To determine prevalence of diabetic ischaemic maculopathy and determine its association with systemic diseases.

METHODS-86 patients of type 2 diabetes with retinopathy were studied during July-December 2013.All patients were evaluated for retinopathy and maculopathy by fundus photography and fluorescein angiography and for systemic diseases by clinical examination and laboratory investigations.

RESULT- Out 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- Nephropathy was significantly associated with macular ischaemia. Macular ischaemia may serve as a marker for nephropathy in type 2 diabetes mellitus irrespective of the severity of retinopathy.We recommend that a diagnosis of macular ischaemia in a type 2 diabetic patient, irrespective of the severity of retinopathy, should alert the ophthalmologist to the possibility of nephropathy so that appropriate investigations and management strategies may be instituted.

Introduction

Diabetic macular ischemia (DMI) is a rare cause for blindness in diabetic patients. Ischemic maculopathy is important as it is not amenable to treatment. Most studies on DMI consider it as macular involvement in the setting of a generalized capillary drop-out, not a unique entity . Concomitant systemic diseases are known to aggravate diabetic retinopathy and increase the risk of visual loss through DME and PDR. Although, some studies report a significant association between macular ischemia and nephropathy, its correlation with other systemic diseases has been a subject of controversy. We designed to study a correlation between diabetic macular ischemia and selected systemic diseases like hypertension, renal disease, anemia and hyperlipidaemia, hyperglycemia, ischemic heart disease and stroke.

Material and Methods

STUDY DESIGN

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

1. Patients of type 2 DM attending eye OPD with ocular complaints.
2. Diabetic patients attending diabetic clinic in medicine OPD.
3. Patients of diabetic retinopathy referred to our Retina clinic.

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 1diabetes 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. Any prior photocoagulation in the macular region
5. Macular ischemic status doubtful after FFA
6. Concomitant fundus pathology that could potentially affect FAZ (e.g., arterial/venous occlusions)
7. Concomitant ocular pathology that could potentially influence the progression of diabetic retinopathy such as glaucoma, high myopia, retinitis pigmentosa, other causes of optic atrophy
8. Carotid vascular disease detected by clinical examination
9. Patients of on haemodialysis or peritoneal dialysis
10. Patients on insulin treatment

INVESTIGATIONS-

1. Fundus fluorescein angiography (FFA).

Fundus fluorescein angiography – All patients included in the present study underwent FFA. 3ml ampule of 20% sodium fluorescein dye was injected in anticubital vein. 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 on the basis of macular perfusion Diabetic Maculopathy was further classified as:

1. No leakage
2. Focal macular edema
3. Diffuse macular edema
4. Ischemic maculopathy

Ischemic maculopathy- We used the criteria described by Bresnick et al to define macular ischemia. The minimum criterion for diagnosing macular ischemia was moderate FAZ irregularities. Moderate irregularities were defined as abnormally dilated and tortuous capillaries budding into the FAZ, terminal arterioles/venules directly abutting FAZ margins, and enlarged intercapillary spaces around the FAZ. The size was a minor criterion compared to the irregularity of FAZ. Ischemia was diagnosed only when the longest diameter of FAZ was > 1000 µ. Severe FAZ irregularities were defined as the destruction of the FAZ architecture: grossly enlarged FAZ with "pruned off" arterioles. Normal FAZ was defined as an FAZ <1000 µ in the longest diameter, regular and round/horizontally oval in shape. Mild undulations of FAZ were also considered normal.

We categorized all patients examined into two groups on the basis of macular perfusion, namely ischemic group and non ischemic group. Systemic factors were studied and the two groups were compared for association of risk factors.

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 86 patients showed clinical evidence of diabetic retinopathy on ophthalmoscopy. So the prevalence of DR in our study was 34.4%

TABLE 1- GRADING OF DIABETIC RETINOPATHY ACCORDING TO ETDRS CLASSIFICATION

	NPDR (n=114; 62.2%) EYES			PDR
	MILD	MODERATE	SEVERE	
No. of Eyes	25	62	27	58
% of Eyes	15.69%	36.04%	14.53%	37.8%

TABLE 2- PREVALANCE OF CSME AND NON CSME

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

TABLE 3- ANGIOGRAPHIC CLASSIFICATION OF DIABETIC MACULOPATHY

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 ISCHEMIC MACULOPATHY WITH SYSTEMIC RISK FACTORS

S. No.	SYSTEMIC FACTORS	ISCHEMIC MACULO -PATHY	NON-ISCHEMIC MACULO -PATHY	CHI-SQUARE	P -VALUE
1	HTN	5	51	6.364	0.0116*
2	Hyperlipidaemia	5	13	0.6868	0.4733
3	Nephropathy	6	13	4.189	0.0407*
4	Anaemia	9	39	0.4866	0.4854
5	HbA1c	5	32	0.3644	0.5461
6	CAD	0	6	1.254	0.2628
7	Stroke	1	2	0.6634	0.4154
8	PVD	1	4	0.05393	0.8164

(*-p value less than 0.05; Significant)

DISCUSSION

The ability of laser therapy to stabilize or restore the visual acuity in diffuse macular edema and focal macular edema is not amenable to ischemic maculopathy. For this reason, identification of the risk factors for ischemic maculopathy may allow better management of this complication of DR. The goal of the present study was to determine systemic factors that may be associated with an increased risk of macular ischemia in DR patients compared with patients having focal and diffuse macular edema.

DIABETIC RETINOPATHY GRADING ACCORDING TO ETDRS CLASSIFICATION

In our study Out of total 172 eyes examined, mild NPDR was seen in 15.69% of eyes , moderate NPDR presents in 36.04% of eyes , severe 14.53% NPDR found in of the eyes while PDR was seen in 37.8% of eyes .A study by Rema M et al report prevalence of 30.8 percent with NPDR, 3.4 per cent with PDR and 6.4per cent had DME.

PREVALANCE OF CLINICALLY SIGNIFICANT MACULAR EDEMA

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 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.

PREVALANCE OF MACULAR ISCHEMIA

In our study we found 16.27% patients with macular ischemic changes, which was comparable to those previously reported by Dawn A. Sim et al (2013).

SYSTEMIC RISK FACTORS IN ISCHEMIC MACULOPATHY

In our study we found that systemic risk factors like hypertension (p-0.0116) and nephropathy (p- 0.0407) were significantly associated with ischemic maculopathy that is similar to the study D Shukla et al (2004) found that macular ischemia was significantly (p=0.025) associated with nephropathy.

CONCLUSION AND SUMMARY

Diabetic macular ischemia (DMI) is an important cause of visual impairment in patients with diabetic retinopathy. DMI is best visualized using fluorescein angiography (FA), and is characterized by enlargement and disruption of the foveal a vascular zone (FAZ), and by retinal capillary loss in other, non-contiguous areas of the macula (‘‘capillary drop-out’’).

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. All the patients underwent following protocol for examination.-

✓ Consent, Registration, detailed history, best corrected visual acuity, slit lamp examination, Fundus examination using direct ophthalmoscopy and slit lamp bio microscopy, fundus fluorescein angiography, fundus photography.

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.

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- ✓ 33.74% patients had no leakage on fundus fluorescein angiography.
- ✓ In our study prevalence of macular ischemia found to be 16.27%.
- ✓ Various systemic risk factors like hyperglycaemia, hyperlipidaemia, hypertension, nephropathy, ischemic heart disease, stroke, peripheral vascular disease were studied in all patients.
- ✓ Among the various systemic risk factors assessed, ischemic maculopathy was significantly associated with hypertension ($p = 0.0116$) and nephropathy ($p = 0.0407$).
- ✓ Macular ischemia may serve as a marker for nephropathy in type 2 Diabetes mellitus irrespective of the severity of retinopathy.
- ✓ We recommend that a diagnosis of macular ischemia in a type 2 Diabetic patient, irrespective of the severity of retinopathy, should alert the ophthalmologist to the possibility of nephropathy so that appropriate investigations and management strategies may be instituted.

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