Study of Incidence of Macular Edema in Diabetic Retinopathy

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Abstract: _Title: Study of Incidence of macular oedema in diabetic retinopathy. Purpose: With advent of optical coherence tomography(OCT), the presence and severity of DME can now be assessed accurately and to examine different diabetic retinopathylesions (microaneurysms, haemorrhage, neovascularisation) to compare noncontact lens biomicroscopy with Optical Coherence Tomography(OCT) for detection of diabetic macular edema. Materials and Methods: This is a cross sectional study carried out on 1000 eyes of 500 patients of age group from 18-80 years, selected by nonprobability convenient sampling having no significant media opacity like dens cataract, significant corneal opacity, vitreous hemorrhage which prevents visualization of fundus.Detailed history taking, assessment of visual acuity (unaided, best corrected), detailed anterior and posterior segment examination including Central Macular Thickness (CMT) by Optical Coherence Tomography(OCT) was done in all the patients. Result: Clinically incidence of macular edema was 9.8% and by OCT examination it was 12%. Conclusion: Average macular thickness in PDR patients is higher than NPDR Patients. Higher the macular thickness, lesser the visual acuity. Incidence of macular oedema is higher according to OCT(12%) than clinical findings(9.8%)._

Keywords: Diabetic Macular Edema, Central Macular Thickness (CMT), Optical Coherence Tomography (OCT), Proliferative Diabetic Retinopathy (PDR), Non Proliferative Diabetic Retinopathy(NPDR)

1. Introduction

Diabetic Retinopathy (DR) is the leading cause of vision loss in adults. DR is ranked as the fifth most common cause of preventable blindness and fifth most common cause of moderate to severe visual impairment. An estimated 285 million people worldwide with diabetes, over one-third have signs of DR, and a third of these are afflicted with vision-threatening diabetic retinopathy (VTDR), defined as severe non-proliferative DR or proliferative DR (PDR) or the presence of diabetic macular edema.

Diabetic Retinopathy is progressive microangiopathy of retinal vessels. Mechanism includes loss of pericytes, thickening of basement membrane leading to microaneurysms& breakdown of blood retinal barrier further leading to edema, hard exudates, dot and blot haemorrhages. Also there is nonperfusion of retina due to aggregation of platelets in capillaries. Compensation occurs in form of shunt vessels also known as 'Intraretinal microvascular abnormalities' (IRMA) & expression of 'Vascular endothelial growth factor' (VEGF) leading to neovascularisation. Laser photocoagulation is used to convert the hypoxic areas into anoxic areas thus decreasing chances of release of VEGF & hence neovascularisation.

PDR is the most common vision-threatening lesion particularly among patients with type 1 diabetes. However, diabetic macular edema is responsible for most of the visual loscs experienced by patients with diabetes as it remains the major cause of vision loss in the highly prevalent type 2 diabetes and is invariably present in patients with type 2 diabetes with PDR.
Two different types of DMO are recognized[4]. Focal macular edema, which is characterized by focal leakage from microaneurysms and is often associated with intraretinal lipid deposition in circinate pattern; and diffuse macular edema, which is characterized by diffuse leakage from capillaries and formation of cystoid spaces. In eyes with diffuse macular edema, laser treatment cannot be focused on localised leaking microaneurysms, since there is diffuse leakage from the capillary bed and thickening of entire macula. In the ETDRS, grid laser treatment was applied to areas of diffuse macular edema.[2,5]

If fundus examinations are initiated prior to the development of significant retinopathy and repeated periodically, and if the recommendations of the Early Treatment Diabetic Retinopathy Study (ETDRS) are followed with respect to the management of subsequent diabetic macular edema or neovascularization, the risk of severe visual loss is less than 5%. [1]

Optical Coherence Tomography(OCT) offers a method of high resolution cross sectional imaging of retina utilizing light to detect relative changes in reflection at optical interfaces. OCT has proved to be useful technique for quantifying macular thickness in patients with diabetic macular edema.[5]

2. Objectives

1) To educate patient regarding screening for Diabetic retinopathy.
2) With advent of optical coherence tomography(OCT), the presence and severity of DME can now be assessed accurately.
3) To examine different diabetic retinopathy lesions (microaneurysms, haemorrhages, neovascularisation).
4) To examine systemic associations of DME.
5) To compare non contact lens biomicroscopy with Optical oherence Tomography(OCT) for detection of diabetic macular edema.

3. Materials and Methods

This is a cross sectional study carried out on 1000 eyes of 500 patients of age group from 18-80 years, selected by nonprobability convenient sampling. This study involved 402 eyes of 201 females and 598 eyes of 299 males. Patient presenting at OPD of GTSH Eye hospital and PDU Govt. Medical College and Hospital, Rajkot. The study was carried out during period of January 2018-July 2019.

Inclusion Criteria
All adult patients having diabetic retinopathy. in PDUMC, Rajkot.

Exclusion Criteria
The patients having significant media opacity like dens cataract, significant corneal opacity, vitreous haemorrhage which prevents   visualisation of fundus.

All the cases underwent a detailed history taking and ocular examination. It consisted of assessing Unaided Visual Acuity (VA), and the Best Corrected Visual Acuity (BCVA). Anterior segment examination was done with a Slit Lamp Biomicroscope; and after dilating the patient's pupil, posterior segment examination was done with Binocular Indirect Ophthalmoscopy, 90D and OCT for Central Macular Thickness (CMT).

In current study central Macular thickness in OCT >250µm and by binocular indirect ophthaloscopic examination, 90D lens examnation ,retinal thickening within 500 µm of the centre of the macula or exudates within 500 µm of the centre of the macula, if associated with retinal thickening (which may be outside the 500 µm – upper right)or retinal thickening one disc area (1500 µm) or larger, any part of which is within one disc diameter of the centre of the macula, lower centre)(according to ETDRS classification) is considered as diabetic macular edema.

4. Result and Analysis

In current study of 500 patients 299 were male and 201 were female in which common age group of presentation is 50-70 years. Out of 500 patients, 424 patients had NPDR and 76 patients had PDR. Out of 280 patients with controlled diabetes , 30 patients had PDR and out of 144 patients with uncontrolled diabetes, 46 patients had PDR.
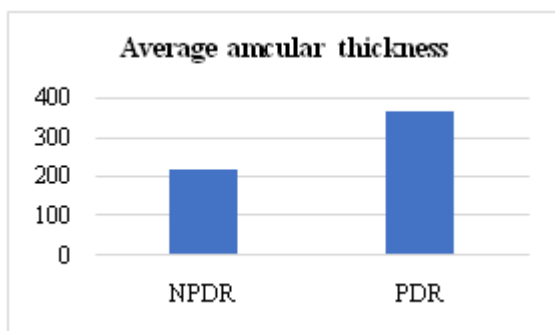

Chart 4.1 Distribution of patient on basis of association between Stage of DR and macular thickness in which

patients with NPDR has average macular thickness of 217µm and patients with PDR has average acular thickness of 364 µm.
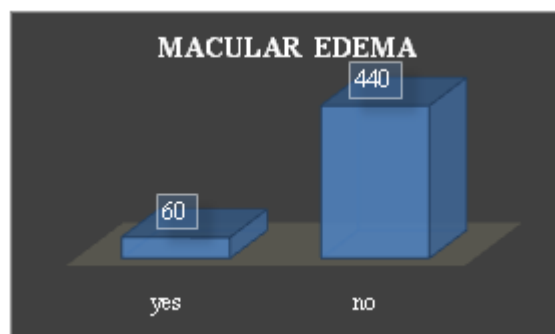

Chart 4.2 shows Distribution of patient according to presence of macular edema in DR patientsaccording to OCT Macular thicknessin which macular edema is present in 12% of patients(60 patients) and percentage of patients without macular edema is 88%(440 patients).
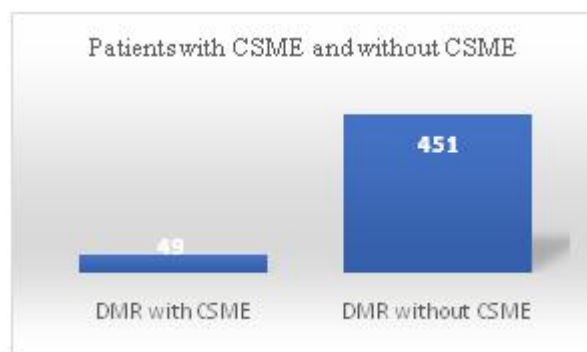

Chart 4.3 shows Distribution of patient according to clinically significant macular edema clinically in which patients with CSME are 9.8%(49 patients) on clinical fundus examination.
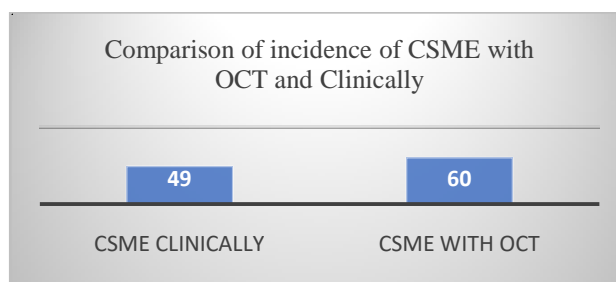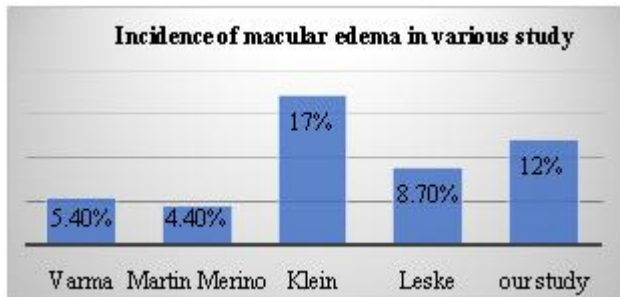

Chart 4.4 shows comparison between incidence of macular edema according to OCT and clinical findings in which incidence of macular edema is higher in OCT findings(12%) than clinically(9.8%).

5. Discussion

Chart 5.1: Comparison of incidence macular edema in different studies

In current study, incidence of macular edema is 12%, while in Verma et al study, it is 5.4%. In Klein et al study it is 17% and Leske et al study 8.7%.
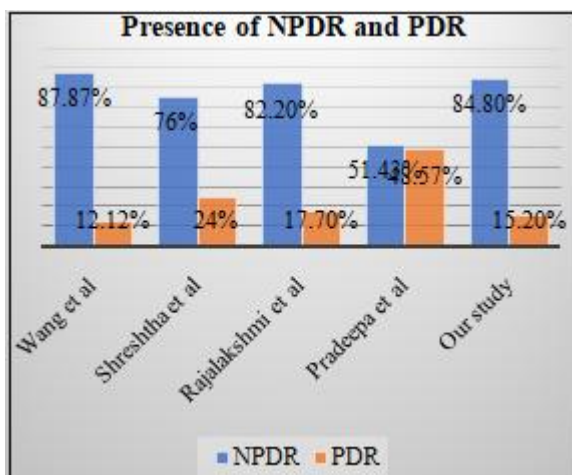

Chart5.2: Comparison of presence of NPDR and PDR in diabetic Retinopathy

In current study presence of NPDR is in 84.8% patients and PDR is in 15.2% patients which is consistence with Rajlakshmi et al study.
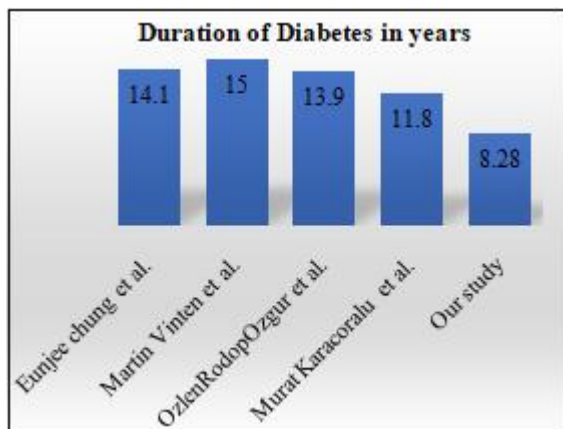
Chart 5.3: Comparison of average of duration of diabetes at presentation of macular edema in different studies

In current study, average duration of diabetes in years since it is diagnosed is 8.28 years while in eunjeechung et al study it is 14.1 years , in Martin Vinten et al study it is 15 years, in OzlenRodopOzgur et al it is 13.9 years and in Murat et al study it is 11.8 years.
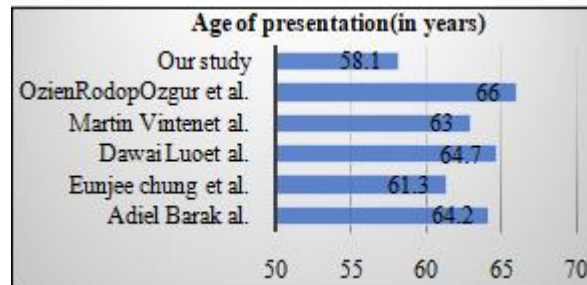
Chart 5.4: Comparison of average age of presentation of macular edema in different studies.

In current study average age of presentation is 58.1 years which is lesser than other studies like in OzienRodopOzgur et al study it is 66 years, in Martin Vinten et al it is 63 years, in Dawai Luo et al 64.7 years, in Eunjeechung et al it is 61.3 years.

6. Conclusion

1) Incidence of macular edema in diabetic retinopathy is 12%
2) Average age of presentation of macular edema is58.1years.
3) Average duration of diabetes at presentation of macular edema 8.28 years.
4) Maximum number of patients diagnosed as having diabetic retinopathy were after duration of diabetes between 6-10 years.
5) Average macular thickness in PDR patients is higher than NPDR Patients.
6) Higher the macular thickness, lesser the visual acuity.
7) Incidence of macular edema is higher according to OCT (12%) thanclinical findings(9.8%).

References

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