ROLE OF OPTICAL COHERENCE TOMOGRAPHY IN DIABETIC MACULOPATHY IN NON-PROLIFERATIVE DIABETIC RETINOPATHY AND ITS MANAGEMENT

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ABSTRACT

BACKGROUND

Diabetic retinopathy and diabetic macular oedema are leading causes of blindness throughout the world and cause significant visual morbidity. Ocular imaging has played a significant role in management of diabetic eye disease.
Aim- To study the role of OCT in management of diabetic maculopathy in Non-Proliferative Diabetic Retinopathy.

MATERIALS AND METHODS

A descriptive study was conducted over a period of 18 months from June 2016 to November 2017 at Dr. B. R. Ambedkar Medical College and Hospital, Bengaluru. A total of 100 eyes of 50 patients were taken into the study. Informed consent was obtained from all the patients considered for the study. A detailed history, ocular examination, best corrected visual acuity, intraocular pressure with GAT, visual fields and fundus examination using indirect ophthalmoscope, +90D lens and OCT was done.

RESULTS

Among the patients who received anti-VEGF treatment best corrected visual acuity improved in 38% of cases, while 15% of cases showed no improvement.

CONCLUSION

Incidence of diabetic maculopathy is common after 50 years with diabetes of longer duration. Disease affects both eyes asymmetrically. OCT is an important diagnostic tool to detect maculopathy and helps in deciding further management based on the type of maculopathy. Early treatment with double frequency Nd-YAG green laser of 532 nm can stabilise the visual acuity and prevent further visual loss. Diabetic maculopathy is the commonest cause of visual loss in patients with Diabetic Retinopathy. Regular follow-up and repeated OCT examination is mandatory to detect the involvement of macula at an earlier stage.

KEY WORDS

OCT: Optical Coherence Tomography; GAT: Goldmann's Applanation Tonometer; Nd-YAG: Neodymium Yttrium Aluminium Garnet.

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BACKGROUND

Diabetic retinopathy and diabetic macular oedema are leading causes of blindness throughout the world and cause significant visual morbidity. Ocular imaging has played a significant role in management of diabetic eye disease. Retinal oedema threatening or involving the fovea often results in vision loss. It is an important consequence of abnormal retinal vascular permeability in diabetic retinopathy. The diagnosis of DME is made when retinal thickening is observed with slit-lamp biomicroscopy or on OCT. Observations include the location of retinal thickening relative to the foveal centre; presence and location of exudates; and presence of cystoid macular oedema. Fluorescein angiography is useful in demonstrating the breakdown of the blood-retina barrier by showing retinal capillary leakage. However, examination with OCT or slit-lamp biomicroscopy is done. Fluorescein angiogram is performed for confirming the microaneurysms, which appear as a group of punctate foci of hyperfluorescence. Diffuse macular oedema demonstrating diffuse thickening of the retina with glistening surface. Fluorescein angiogram confirming the diffuse intraretinal leakage. Leakage shown on the angiogram may occur in the absence of macular retinal thickening and is thus not considered macular oedema.

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Aim of the Study

To study the patients with diabetic maculopathy in NPDR coming to Dr. B. R. Ambedkar Medical College OPD and IPD.
Specific Objectives-

a. To study various types of Diabetic Macular Oedema using OCT.
b. To evaluate the visual outcome after treating with anti-VEGFs.

MATERIALS AND METHODS

A descriptive study was conducted over a period of 18 months from June 2016 to November 2017 at Dr. B. R. Ambedkar Medical College and Hospital, Bangalore.

A total of 100 eyes of 50 patients were taken into the study. Informed consent was obtained from all the patients.

Patients were enrolled in the Study if they satisfied the following Criteria-

Inclusion Criteria

1. Both sex.
2. Age between 40 and 70 years.
3. Patients with type 2 Diabetes Mellitus.
4. Duration: 5 – 20 years.

Exclusion Criteria

1. Patients with opaque media.
2. Patients with proliferative diabetic retinopathy.
3. Neovascular glaucoma.
4. Vascular occlusions.
5. Juvenile diabetes mellitus.

Detailed history, ocular examination, best corrected visual acuity, intraocular pressure with GAT, visual fields, fundus examination using indirect ophthalmoscopy and fundus fluorescein angiography, OCT was done.

RESULTS

1. Age of Onset

In our study, the age group predominantly affected was 51 - 60 years (34%) followed by 61 - 70 years (24%) and 41 - 50 years range (20%). 54% of cases were aged between 41 - 60 yrs.[1] (Figure 1).

Sl. No.	Age Groups in Years	No. of Patients	Percentage (%)
1	41 - 50	10	20
2	51 - 60	17	34
3	61 - 70	12	24
4	71 - 80	3	6
Table 1			

2. DME Incidence with Advancing Severity of Diabetic Retinopathy

56% of patients with severe NPDR had macular oedema as compared to 36% with moderate NPDR and 8% with mild NPDR (Figure 4).

NPDR	No. of Patients with DME	% Patients with DME
Mild	4	8
Moderate	18	36
Severe	28	56
Table 2		

3. Moderate and Severe Visual Loss in Anti-VEGFs treated patients with CSME

Visual Loss	No. of Cases	%
Moderate	13	37.14
Severe	1	2.85
Table 3. 37.14% had Moderate Visual Loss and 2.85% had Severe Visual Loss		

4. Retinal Thickening after 1 Year Follow-Up with OCT

Among treated patients retinal thickening persisted only in 35%, whereas 63% of untreated patients showed retinal thickening (Figure 5).

No. of Patients		Retinal Thickening	% Persistence
Treated	36	12	35
Untreated	14	9	63
Table 4			

5. Visual Acuity on Presentation

30% patients had 6/24 - 6/60 visual acuity on presentation and 7% had < 3/60.[2]

Best Corrected Visual Acuity on Presentation	No. of Cases	%
6/6 - 6/12	10	10
6/12 - 6/24	27	27
6/24 - 6/60	30	30
6/60 - 3/60	24	24
< 3/60	7	7
Table 5		

Hence, majority of our patients presented in the visual acuity range of 6/24 - 6/60 (Figure 2).

6. Visual Outcome after treatment with anti-VEGFs[3]

Best Corrected Visual Acuity after Anti-VEGF	No. of Cases	%
Number of patients who gained 10 or more letters	38	38
No improvement	15	15
Table 6		

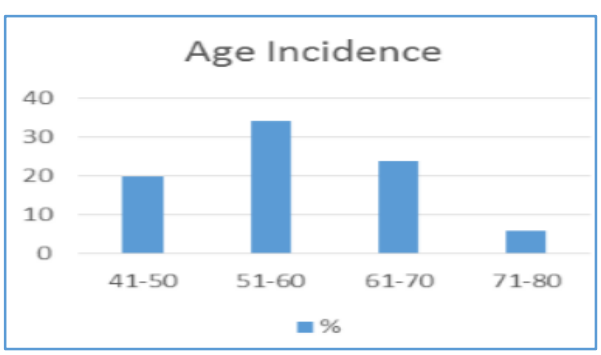

Figure 1

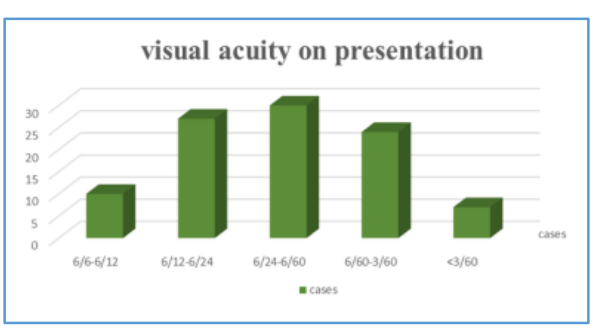

Figure 2

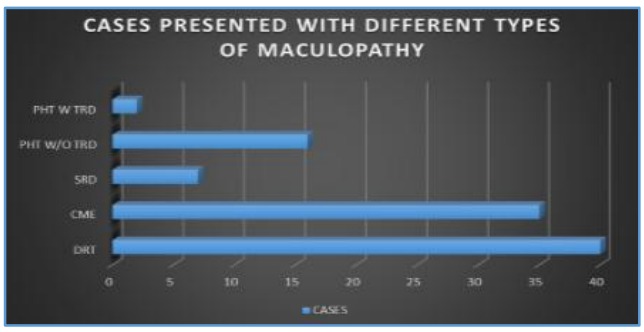

Figure 3

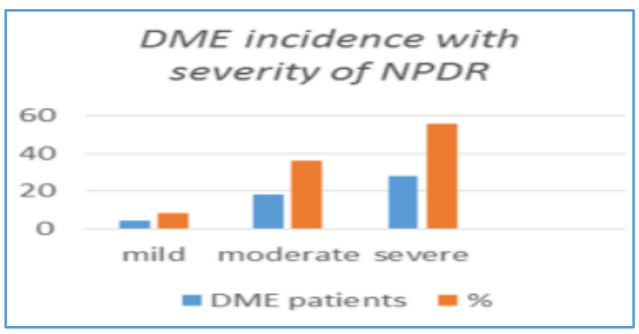

Figure 4

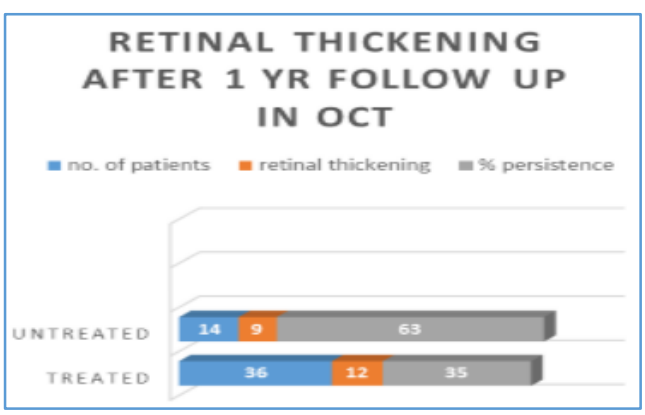

Figure 5

DISCUSSION

Diabetes Mellitus is a condition in which the blood glucose levels are elevated. It mainly affects small vessels and involvement of retina is common.[4] According to ETDRS, diabetic retinopathy is divided into Mild, Moderate, Severe NPDR and Proliferative Retinopathy.[5] Diabetic Maculopathy is one of the components of DR which has direct effect on vision, more in NPDR patients. Prevalence of DME in DR patients is 29%.[6] DME is defined as oedema/ hard exudates present within 500 µm of the foveal centre or oedema of > 1DD of the foveal centre.[7] This study was carried out to learn the role of OCT in early detection of diabetic maculopathy and its management.

Optical Coherence Tomography (OCT) is a non-invasive, non-contact transpupillary imaging modality. It utilises light to image tissue using low coherence interferometry. OCT produces cross-sectional images of the macula allowing objective evaluation of macular thickness and evaluation of the vitreomacular interface. However, it must be noted that there is poor correlation between macular thickness and visual acuity. Several OCT patterns of morphological macular changes associated with DME have been described. These include diffuse retinal thickening, cystoid macular oedema, posterior hyaloid traction, serous retinal detachment and tractional retinal detachment.[8] These patterns are not exclusive of each other and may co-exist with one another. OCT is an essential tool in the current management of this condition. Anti-VEGF therapy plays an increasing role in the treatment of DME.[9]

In our study the age group affected predominantly are between 41 - 60 years, which correlates with the Wisconsin Epidemiological Study of Diabetic Retinopathy (Klein et al. Arch. 1986) that shows diabetic retinopathy more common in the elderly population aged 45 to 64 years.

According to Wisconsin Epidemiological Study of Diabetic Retinopathy, macular oedema was more prevalent in severe NPDR than others. In our study 56% of patients with severe NPDR had macular oedema, 36% with moderate NPDR and 8% with mild NPDR. The current study shows that there is a moderate visual loss among 33.3% untreated patients and severe visual loss among 6.6% patients untreated. Among the patients treated with anti-VEGFs, 37% had moderate visual loss and 3% had severe visual loss which correlates with the ETDRS that the treatment with anti-VEGFs are effective in preventing visual acuity loss.[10]

In this study, OCT shows retinal thickening in 35% of treated patients and 63% of untreated patients after a 1-year follow-up.[11]

In the current study, 30% patients had visual acuity of 6/24 - 6/60 on presentation and 7% had < 3/60. Hence, majority of our patients presented in the visual acuity range of 6/24 - 6/60, which correlates with the Becker et al study. Patients with diffuse maculopathy had visual acuity in the range of 6/60 - 3/60 on presentation. Ischaemic maculopathy patients had visual acuity of 6/24 or less on presentation. Most patients with focal type had good visual acuity initially. After treatment with anti-VEGF, 38% of patients had at least 10 letter improvement of best corrected visual acuity.

CONCLUSION

Diabetic Maculopathy is the commonest cause of visual loss in patients with Diabetic Retinopathy. Regular follow-up and examination is necessary to detect the involvement of macula at an earlier stage.[12]

Incidence of diabetic maculopathy is common after 50 years with diabetes of longer duration.[13] Disease affects both eyes asymmetrically. OCT is an important diagnostic tool to detect maculopathy. Early treatment with anti-VEGFs improves the visual acuity and prevent further visual loss.[14] Repeated injection of anti-VEGFs depends upon the severity of the diabetic macular oedema.[15]

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