



CORRELATION OF VISUAL ACUITY WITH CENTRAL MACULAR THICKNESS IN DIABETIC MACULAR EDEMA

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ABSTRACT

AIM: to describe the correlation of central macular thickness with visual acuity (VA) in diabetic macular edema (DME) And various patterns of DME demonstrated by optical coherence tomography(OCT)

STUDY: observational case series.

METHODS: All patients with DME who had OCT scan and met with inclusion criteria were taken.

Central macular thickness (CMT) and VA were noted.

Type 1 : Diffuse retinal thickening (DRT),

Type 2 : cystoid macular edema (CME)

Type 3: DME With serous retinal detachment (SRD)

Type 4 : DME with Trational component {posterior hyloid traction (PHT)/epiretinal membrane(ERM) /vitreous traction(VT)}

Type 5 : combination of above all patterns were noticed.

RESULTS: OCT scans of 98 eyes with DME were taken. In 98 eyes with DME, DRT (35.82%), CME (27.55%), DME with SRD(20.40%), DME with PHT/ERM/VT(12.23%) and combination of above patterns(4.08%) were observed. Mean retinal thickness and Mean VA varied with sub-groups and significant correlation present (at $p < 0.05\%$).Increasing CMT was significantly correlated with worse VA (at $p < 0.05\%$)

CONCLUSION: DME exhibits at least 5 different patterns on OCT and there is a negative correlation between CMT and visual acuity.

KEYWORDS :

INTRODUCTION :

Macular edema is the leading cause of decrease in visual acuity in patients with diabetes.

ETDRS(Early Treatment Diabetic Retinopathy Study) defined diabetic macular edema as focal or diffuse retinal thickening in the macular area, when it involves or threatens the fovea; it is defined as clinically significant. According to the guidelines, diagnosis and follow-up of macular thickening is made by bio microscopy and FFA(Fundus Flourescein Angiography) which is subsequently used to guide the laser treatment.

The recent focus has been on outer retinal alternations and inner retinal layers integrity, which can be made out by Optical coherence tomography (OCT).

OCT is a non invasive noncontact trans-pupillary imaging modality.

Now a days, OCT greatly enhanced our ability to detect macular thickening, morphology of the edema and on the presence of the vitreal traction. It demonstrates that macular edema is a complex entity with varied morphological changes. Classification based on OCT has proved to be useful in monitoring disease progression and treatment.

AIM: to describe the correlation of central macular thickness with visual acuity (VA) in diabetic macular edema (DME) And to study various patterns of DME demonstrated by optical coherence tomography (OCT).

METHODOLOGY:

This is an observational case series, conducted in Govt Regional eye hospital, Andhra medical college; Visakhapatnam. 98 eyes of 58 patients with DR who had OCT scan since Feb 2017 to May 2017 were taken.

Inclusion criteria:

All the patients with diabetic macular edema, irrespective of stage of retinopathy who had undergone OCT were included.

Exclusion criteria:

Eyes with cataract,corneal opacities,glaucoma,optic nerve disease.

Other causes of macular edema (crvo, brvo, csr etc..)

The central macular thickness and the visual acuity (as per the patients

records) at the first visit to the hospital were noted. Baseline OCT is taken for the study.

The OCT scans were analysed accordingly and grouped under various types based on their morphological changes.

STATISTICS : chi 2 test was used to assess the statistical relation between two variables. A probability of (p value) < 0.05 was considered significant.

RESULTS:

35(60.3%) men and (39.7%) women were included in the study.

Mean age of the patients - 49.2years

- The best corrected visual acuity in all eyes ranged from 0.3log mar to >1 log mar (CF 3mt)
- With mean visual acuity (VA) -0.7 ± 0.1
- The central macular thickness(CMT) value in all eyes ranged from $290\mu\text{m}$ to $780\mu\text{m}$
- The mean value of CMT – $489.2\mu\text{m}$

OCT data :

On analysis of the OCT images, 5 different morphological patterns were observed and these are grouped into 5 types.

Type 1 : diffuse retinal thickening

Type 2 : cystoid macular edema

Type 3 : DME with serous retinal detachment

Type 4 : DME with trational component (posterior hyaloids traction/epiretinal membrane/TRD)

Type 5: combination of above patterns

	Type 1	Type 2	Type 3	Type 4	Type5	total
No.of eyes	35	27	20	12	4	98
Percent	35.82%	27.55%	20.40%	12.23%	4.08%	100%

Mean visual acuity in type 1: 0.4 ± 0.1 , type 2: 0.6 ± 0.13 , type3: 0.7 ± 0.2 , type 4: 0.9 ± 0.1 , type 5: 1 ± 0.1 ,

Mean CMT in type 1 : 357μ , type 2: 479μ , type 3: 570μ , type 4: 490μ , type 5: 530μ .

The correlation between the central macular thickness and visual acuity in DME is assessed

	250-450	450-650	>650	total
≥1	1	2	12	15
0.5 – 0.9	11	29	10	50
0-0.5	24	9	0	33
Total	36	40	22	98

There is a significant negative correlation has been observed between the two variables.

Correlation of visual acuity with various types of DME was assessed

	Type 1	Type 2	Type 3	Type 4	Type 5	total
≥1	0	1	3	9	2	15
0.5 - 0.9	12	20	15	3	2	50
0 – 0.5	23	6	2	0	0	33
Total	35	27	20	12	4	98

Visual acuity varied within the OCT types of DME.

It is found that the eyes with tractional component were shown to have worse visual acuity.

The eyes with serous retinal detachment shown to have poor visual acuity second after DME with tractional component.

Central macular thickness varied with varied types.

There is significant difference in the CMT between the types.

The mean CMT values was least in type 1 (DRT) and most in type 3 (DME with SRD)

- There is a significant positive correlation between the CMT and Log MAR values of visual acuity in type 1 –diffuse retinal thickening (DRT)
- The correlation between the two variables is modestly seen in other groups, not statistically significant.

Discussion:

The most common cause of decreasing visual acuity in patients with diabetes is diabetic macular edema.

The diabetic macular edema can be assessed subjectively by slit lamp bio microscopy, but for objective evaluation and quantification, optical coherence tomography(OCT) is the best imaging modality.

It is useful in analysing the morphological changes at the macular area in a detailed and precise way, which is further helpful in planning of treatment and monitoring of the disease.

There are various studies which provide insight into the OCT based classification of diabetic macular edema. In the current study,

- DRT occurred in 35.82%, CME in 27.55%, DME with SRD in 20.40%, DME with PHT/ERM/VT in (12.23%) and combination of above patterns(4.08%) were observed
- DRT was the most common feature found.
- Better VA is seen in diffuse type when compared to other types.
- Low range of CMT values seen in diffuse type.
- Which is consistent with the study by Kim et al , Otani et al.,

Where DRT was seen as most common pattern, CME is seen as second most common pattern.

In the present study,

Central macular thickness and visual acuity varied between the groups.

- There is a significant negative correlation between VA and CMT when evaluated in all eyes with DME.
- The statically strong negative correlation between VA and CMT is seen with diffuse retinal thickening (DRT)
- There is modest correlation between the two variables in other types but were not statically significant
- Paradoxically in type with DME with tractional component, even though there is no greater CMT values, visual acuity remained to be worse.

These results are comparable with the study by Kim et al, and Otani et al where there is significant correlation between the these two variables is seen irrespective of pattern of DME

But in the studies by Murakami et al, Yamamoto et al, the mean log MAR VA with CME shown to have worse visual acuity than with SRD type or diffuse type.

Conclusion: In this study, we can see that diabetic macular edema exhibits 5 types of patterns on OCT images.

There is a negative correlation between the central macular thickness and visual acuity irrespective of pattern.

Linear negative correlation between VA and CMT were seen in Diffuse retinal thickening alone

With comparably good VA seen in DRT and worse VA in DME with tractional component

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