Correlation of Foveal Thickness Measured on Optical Coherence Tomography And Visual Acuity In Eyes with Idiopathic Epiretinal membrane

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Citation

N Hussain, A Parsai, R Khanna, A Hussain. *Correlation of Foveal Thickness Measured on Optical Coherence Tomography And Visual Acuity In Eyes with Idiopathic Epiretinal membrane*. The Internet Journal of Ophthalmology and Visual Science. 2009 Volume 7 Number 2.

Abstract

Aims: To study whether foveal thickness measured on optical coherence tomography correlates to visual acuity in eyes with premacular idiopathic epiretinal membrane.

Epiretinal membrane (ERM) is a common condition, described in 2 to 6.4% of autopsy eyes.[1] This results in mild metamorphosia to severe visual loss. The pathogenesis of ERM may differ depending on the clinical origin. Idiopathic ERMs occur unassociated with any ocular disorders whereas secondary ERMs are associated with various vascular or non vascular conditions. The differentiating features are etiology, morphology, prognosis and treatment outcome.

Optical coherence tomography (OCT) is a non contact and non invasive medical imaging technique that can produce a high resolution cross sectional images of the retina.[2] OCT has previously been shown to be useful in imaging macular diseases,[2,3] primarily macular holes,[4] lamellar macular hole,[5] diabetic macular edema, [6] and central serous chorioretinopathy.[7]

Typically OCT demonstrates diffuse thickening of the macula with or without associated loss of foveal contour in premacular ERM. OCT could demonstrate the correlation of membrane configuration and pathogenesis (P=0.007, chi-square test).[1] 80% of idiopathic membranes have global adhesion while 52% of secondary membranes have partial adhesion.

Since ERM is associated with thickening of the macula and change in visual acuity, it is expected that change in visual acuity should correlate to the amount thickness in the fovea. With this hypothesis, the present study aims at answering the question whether foveal thickness measured on optical coherence tomography correlates to visual acuity in eyes with premacular idiopathic epiretinal membrane.

MATERIAL AND METHODS

Cases diagnosed to have epiretinal membrane on the macula between the period from 2002 and 2004 were analyzed. The inclusion criteria:

- Idiopathic ERM
- Age > 45 years
- OCT data available
- Absence of cataract

Eyes with any vascular or non-vascular cause adversely affecting the macula were excluded from the analysis.

All patients underwent proper clinical history, visual acuity assessment (Snellen's chart), slit lamp biomicroscopy, fundus examination (90/78 D and indirect ophthalmoscopy), fundus photograph and optical coherence tomography. Trained optometrists performed OCT. OCT (Stratus OCT, Humphrey, Zeiss) was performed using the 6 scans of fast macular scan or at least 4 line scans. The foveal thickness was then measured manually in all the 6 scans by a masked observer. The mean of the thickness is then calculated for the analysis.

STATISTICAL ANALYSIS

For statistical analysis, snellen visual acuity was converted

to logmar visual acuity and linear regression analysis was used to see the correlation between visual acuity and macular thickness. For categorical variable, Chi-square test was used

RESULTS

Thirty four eyes of 34 patients had premacular idiopathic epiretinal membrane. 22 patients (64.7%) were male. The mean age was 54.9 + 15.1 years. Left eye was affected in 52.9% (18 eyes). Eleven (32.4%) of 34 eyes had visual acuity (VA) of > 20/40; 10 eyes (29.4%) had between 20/50 and 20/80, and 13 eyes (34.2%) had between 20/100 and 20/200.

10 eyes (58.8%) with VA > 0.5 had mean foveal thickness < 200 microns and 14 eyes (82.4%) with VA < 0.5 had mean foveal thickness > 200 microns of which 8 (47.1%) had mean foveal thickness of > 350 microns (Table 1). There was a strong association between VA and mean foveal thickness (P=0.04) (Table 1) and a fair correlation visual acuity to mean foveal thickness (r^2 = 0.0509; r=0.23) (Figure 1).

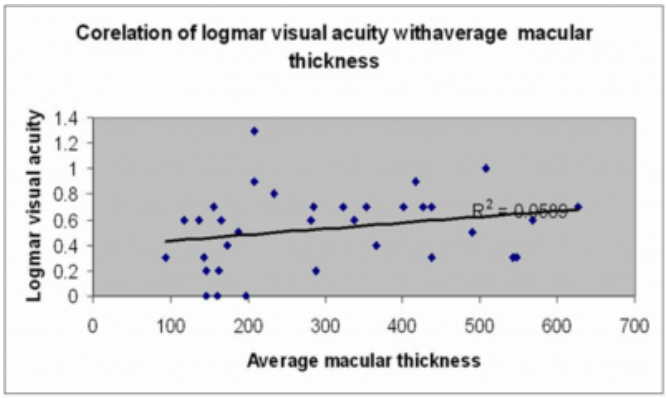
Figure 1

Table 1: Distribution of eyes with visual acuity and mean foveal thickness

	Mean Foveal Thickness			
Logmar visual acuity	≤200 µm (%)	201-350 µm (5%)	>350µm (%)	**Total**
Group 1 (0.5 or better)	10 (58.8)	2 (11.8)	5 (29.4)	**17**
Group 2 (worse than 0.5)	3 (17.6)	6 (35.3)	8 (47.1)	**17**
Total	**13**	**8**	**13**	**34**

Figure 2

Figure 1: Shows the correlation of LogMAR visual acuity and mean foveal thickness.



The result suggest when visual acuity was correlated to mean foveal thickness, the correlation was fair (r=0.23; r^2 = 0.0509). The observation has shown when VA was grouped into better than 0.5 or worse than 0.5 to mean foveal thickness, the association has been found to be significant (P=0.04) when it is worse than 0.5. This also means that mean foveal thickness is important only when VA is worse than 0.5. In clinical practice this appears relevant that eyes with ERM (foveal thickness > 200) and VA < 0.5 may be the patients eligible for surgical removal for possible beneficial outcome.

DISCUSSION

Several prognostic factors have been assessed in the literature and the most significant being the preoperative visual acuity and duration of symptoms. [8] The prognostic value of preoperative macular edema, opacity of the epiretinal membrane and VA is still controversial. In the present study we attempted to know whether preoperative VA correlates to foveal thickness, such that assessment of the foveal thickness and preoperative VA would help in the decision making of contemplating surgical removal of the epiretinal membrane.

Massin et al [8] have shown that the mean foveal thickness decreased from 419 + 105 microns (range: 265.5 to 689 microns) to 300 + 65 (range: 185 to 511) microns following surgery for idiopathic epiretinal membrane. Preoperative visual acuity correlated negatively with preoperative macular thickness (regression coefficient: 0.56; P< 0.001). Besides, there was also no correlation to VA and macular thickness in pre and postoperative status. Mori et al [1] have also shown that the mean thickness in primary idiopathic ERMs was 257 + 139 microns and 274 + 172 microns in secondary ERMs.

The central macular thickness in eyes with idiopathic ERMs correlated with VA when the retinal thickness was between 66 and 480 microns (r^2 = 0.64; P, 0.01).

Present study shows that mean foveal thickness has poor correlation to visual acuity. But when these eyes has been grouped into VA worse or better than 0.5, strong association was found (P=0.04) when VA was worse than 0.5. It can be speculated that the fair correlation between VA and foveal thickness may be due to minimal thickness change when VA is better or possibly due relatively smaller sample size. Initial early change in vision also can be contributed with minimal thickening associated with ERM. When ERM thickens, contraction of this fibrocellular membrane may cause thickening, which may be seen as cystoid macular edema or serous detachment of the macula, and decrease in vision. This has been clearly observed when correlation was calculated with different VA groups. Hence, mean foveal thickness appears important when VA is worse than 0.5.

It is classically known that that early ERM (Grade 0-1) are associated with VA better than 20/40. Published literatures also have shown that ERM is associated with increase foveal thickness in idiopathic ERM as seen on OCT before and after surgery.[8] However, this does not hold true in Diabetics as posterior hyaloid thickens to impair vision. Hence only idiopathic ERM were only included in the study. In clinical practice this appears relevant that eyes with ERM and VA < 0.5 may be the patients eligible for surgical removal for possible beneficial outcome. However, this speculation needs to be addressed with postoperative visual outcome demanding a clinical trial.

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