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OPTICAL COHERENCE TOMOGRAPHY PROGNOSTIC CRITERIA FOR INTRAVITREAL INJECTION OF ANTIVEGF IN DIABETIC MACULAR EDEMA

By

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ABSTRACT

Background: Diabetic macular edema (DME) is the most common cause of visual impairment in diabetic patients. Disruption of both components of blood retinal barrier (BRB) leads to increased accumulation of fluid within the intraretinal layers of the macula. Optical coherence tomography (OCT) enables obtaining the high resolution cross-sectional images (tomograms) of the human retina in a noninvasive manner. It can detect the response of the patient to different modalities of treatment upon some factors will be discussed in that issue.

Objective: Assessment of different patient's response to different modalities of treatment in patients with diabetic macular edema using the OCT.

Patients and methods: In this study, we tested 50 eyes of 35 patients with diabetic macular edema. They were evaluated using the spectral domain OCT before intravitreal injection of antiVEGF and after 1 and 6 months from 1st injection.

Results: The 50 eyes with diabetic macular edema were 22(44%) males and 28(56%) females. The age of patients ranged from 48 to 66 years with a mean of 56.48±4.98, 6(12%) of them had diabetes type one and 44(88%) had diabetes type two. Twelve (24%) were treated by insulin, 9(18%) by tablets, and 29(58%) used both insulin and tablets. As regards other co-morbidities, 12(24%) had hypertension, 6(12%) had nephropathy, and 8(16%) had ischemic heart diseases.

The fifty eyes were 21(42%) right, and 29(58%) left. Eleven (22%) of patients had intraretinal cyst, 11(22%) of patients had subfoveal neuroretina detachment, external limiting membrane (ELM) was disrupted in 10(20%), and inner segment/outer segment (IS/OS) was disrupted in 18(36%).

There was a statistically significant difference between the mean of Logarithim of the Minimum Angle of Resolution best corrected visual acuity (log MAR BCVA) (0.71±0.32) and the central subfoveal thickness mean (470.70±99.14) pre injection, and 1-month post injection log MAR BCVA mean (0.48±0.23), and the central subfoveal thickness mean (386.72±85.92) ($P < 0.001$). BCVA and the central subfoveal thickness continued to improve progressively until the end of the 6-month follow-up period where they were 0.42 ± 0.29 and 384.64 ± 97.69 respectively and that was statistically significant ($P < 0.001$).

Conclusion: OCT characteristics of different DME patterns at baseline can predict morphological features and timing of DME recurrence. OCT characteristics at follow-up can be used in prognosis of DME.

Keywords: Diabetic Macular Edema, Optical Coherence Tomography, intravitreal injection, antiVEGF, Prognostic criteria.

INTRODUCTION

Inflammatory processes such as increased vascular endothelial growth factor (VEGF) levels, endothelial dysfunction, leuckocyte adhesion, decreased pigment epithelium derived factor (PEDF) levels, and increased protein kinase C production cause breakdown of the BRB and increased vascular permeability, are upregulated within the diabetic retinal vasculature *(Murakami et al., 2012)*.

Several therapeutic modalities, including grid laser photocoagulation, intravitreal injection of antiVEGF as ranibizumab *(Massin et al., 2010)*, triamcinolone acetonide or vitrectomy, have been investigated. The efficacies of these therapies have been evaluated by best corrected visual acuity (BCVA), and macular thickness measurement using optical coherence tomography (OCT).

Research is oriented towards identifying earlier preclinical biomarkers of microvascular abnormality in diabetic retina, which is very important, considering that early treatment is associated with better outcome. Novel preclinical biomarkers could also draw attention on the pathogenesis of diabetic retinopathy (DR) *(Rosen et al., 2019)*.

A correlation between best corrected visual acuity (BCVA) and the OCT-macular thickness has been reported, but its significance was variable. A marked decrease in macular thickness after therapy may not improve BCVA, which suggests that macular thickness is only one of several factors to affect BCVA. Recent technological advances in OCT have enabled identification of the external limiting membrane (ELM) and the junction between the inner and outer segments (IS/OS) of the photoreceptors that now known as ellipsoid zone (EZ). Several articles have described association between the integrity of the foveal photoreceptor layer and the BCVA in macular diseases *(Ito et al., 2013)*.

OCT with its objective measurement of macular thickness and detailed view of retinal architecture had become fundamental in DME diagnosis and follow up [18]. However, macular thickness is only one of several factors affecting vision in DME [19]. Another important and potentially irreversible factor is photoreceptor dysfunction [20]. Poor vision with photoreceptors disruption could be related to underlying capillary no perfusion [21].

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In this study, we assessed the changes of the ELM and IS/OS in diabetic macular edema (DME) as well as measuring the central subfield thickness which is defined as the average retinal thickness of the central 1mm scanned area before and after treatment, and investigate the correlation between these changes and BCVA using spectral domain OCT. The superior delineation of the fine structures on SD-OCT images encouraged to evaluate photoreceptor markers, external limiting membrane (ELM), and the junction between the inner and outer segments (IS/OS). Many cross-sectional or longitudinal studies have shown the clinical relevance of the IS/OS line in DME *(Shin et al., 2012)*. The ELM line is another marker of photoreceptor integrity, and its disruption also is associated with visual impairment in DME *(Murakami et al., 2012)*. The transverse length of the disrupted or absent IS/OS line also has been related to visual impairment.

The aim of the present work was to investigate the correlation between central macular thickness, percentage of outer retinal layers (ELM, IS/OS) disruption using OCT and the final visual acuity (VA) after treatment of eyes with diabetic macular edema (DME) with intravitreal injection of Anti VEGF, and to determine the visual prognostic factors.

PATIENTS AND METHODS

This was a prospective observational study that had been carried out on 50 eyes of 35 diabetic patients with decreased visual acuity as a result of diabetic macular edema. OCT was done to all patients before treatment modalities were used.

Inclusion criteria: Diabetic patients with clinically significant diabetic macular edema without proliferative diabetic retinopathy diagnosed by slit-lamp biomicroscopy. They were defined according to early treatment diabetic retinopathy study group (ETDRS).

Exclusion criteria: Corneal or any media opacities, presence of any epi-retinal or macular membrane, history of intraocular inflammation such as anterior or posterior uveitis, macular ischemia diagnosed as areas of macular capillary non-perfusion by fundus fluorescein angiography, siliconized eyed and any other macular pathology.

Visual acuity had been measured by Snellen`s chart after complete ophthalmological examination, then will be converted to Log MAR. OCT had been performed using SD OCT Optovue Avanti , using vertical and horizontal 6-mm line scan passing through the fovea, IS/OS line, ELM and any special or chronic features found as intraretinal cyst had been evaluated in the central fovea with macular central 1mm subfoveal thickness then correlated the findings with

the corresponding best corrected visual acuity (BCVA).

Statistical Analysis: Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software.

The data collected were tabulated and analyzed by SPSS (statistical package for social science) version 25 (Armonk, NY: IBM Corp) on IBM compatible computer.

Two types of statistics were done:

Descriptive statistics: According to the type of data, qualitative was represented as number and percentage and quantitative by mean ± SD.

Analytic statistics:

- Paired Samples Student t-test was used for pairwise comparison of the quantitative variables with normal distribution (for parametric data).
- Wilcoxon test was used for pairwise comparison of the quantitative variables without normal distribution (for non-parametric data).
- Student t-test was used for comparison between two groups having quantitative variables with normal distribution (for parametric data).
- Mann-Whitney U test was used for comparison between two groups having quantitative variables without normal distribution (for non-parametric data).
- ANOVA (f) test (parametric test) was used for comparison between changes in three or more sets of data of the same individuals of quantitative variables normally distributed.
- Related samples Friedman's test (nonparametric test) was used for comparison between changes in three or more sets of data of the same individuals having quantitative variables not normally distributed.
- A P-value of < 0.05 was considered statistically significant.

RESULTS

The 50 eyes with diabetic macular edema were 22(44%) males and 28(56%) females. The age of patients ranged from 48 to 66 years with a mean of 56.48±4.98, 6(12%) of them had diabetes type one and 44(88%) had type two, 12(24%) were treated by insulin, 9(18%) tablets, and 29(58%) used both insulin and tablets for treatment. As regards other co-morbidities, 12(24%) had hypertension, 6(12%) had nephropathy, and 8(16%) had ischemic heart diseases.

The fifty eyes were 21(42%) right, and 29(58%) left.11 (22%) of patients had intraretinal cyst, 11(22%) of patients had subfoveal neuroretinal detachment, ELM was disrupted in 10(20%), and IS/OS was disrupted in 18(36%).

The current study showed that there was a statistically significant difference between the mean of log MAR BCVA (0.71±0.32) and the central subfoveal thickness mean (470.70±99.14) pre injection and 1-month post injection log MAR BCVA mean (0.48±0.23) and the central subfoveal thickness mean (386.72±85.92) ($P < 0.001$). BCVA and the central subfoveal thickness continued

to improve progressively until the end of the 6-month follow-up period where they were (0.42 ± 0.29) and (384.64 ± 97.69) respectively and that was statistically significant ($P < 0.001$).

The patients included in the study with diabetic macular edema were 22(44%) males and 28(56%) females. The age of patients ranged from 48 to 66 years with a mean of 56.48±4.98, 6(12%) of them had diabetes type one and 44(88%) had type two, 12(24%) were treated by insulin, 9(18%) tablets, and 29(58%) used both insulin and tablets for treatment and as regards other co-morbidities, 12(24%) had hypertension, 6(12%) had nephropathy, and 8(16%) had ischemic heart diseases **(Table 1)**.

Table (1): Baseline characteristics of the patients

Parameters \ Patients		Frequency	Percent
Gender	Male	22	44.0
	Female	28	56.0
Age (years)	Mean± SD	56.48±4.98	
	Range	48-66	
Type of DM	Type 1	6	12.0
	Type 2	44	88.0
DM treatment	Insulin	12	24.0
	Tablets	9	18.0
	Both	29	58.0
Hypertension	No	38	76.0
	Yes	12	24.0
Nephropathy	No	44	88.0
	Yes	6	12.0
Ischemic heart diseases	No	42	84.0
	Yes	8	16.0

The study included 50 eyes with central diabetic macular oedema. The fifty eyes were 21(42%) right, and 29(58%) left.11 (22%) of patients had intraretinal cyst, 11(22%) of patients had subfoveal neuroretinal detachment, ELM was disrupted in 10(20%), and IS/OS was disrupted in 18(36%) **(Table 2)**.

Table (2): Description of eyes

Parameters \ Patients		Frequency	Percent
Eye side	Left	29	58.0
	Right	21	42.0
Presence of intraretinal cyst	No	39	78.0
	Yes	11	22.0
Subfoveal neuroretinal detachment	No	39	78.0
	Yes	11	22.0
ELM	Disrupted	10	20.0
	Intact	40	80.0
IS/OS	Disrupted	18	36.0
	Intact	32	64.0

There was a statistically significant difference between the mean of log MAR BCVA (0.71±0.32) and the central subfoveal thickness mean (470.70±99.14) pre injection and 1-month post injection log MAR BCVA mean (0.48±0.23) and the central subfoveal thickness mean (386.72±85.92) (P < 0.001). BCVA and the central subfoveal thickness continued to improve progressively until the end of the 6-month follow-up period where they were (0.42 ± 0.29) and (384.64 ± 97.69) respectively and that was statistically significant (P < 0.001) **(Table 3)**.

Table (3): Comparison pre injection Log MAR BCVA and central subfoveal thickness versus one month and six-month post injection following intravitreal injection

Patients (no. 50) / Parameters		Mean ±SD		
Log MAR BCVA	**Pre injection**	0.71	±	0.32
	1 month post injection	0.48	±	0.23
	P-value	< 0.00		
	6 months post injection	0.42	±	0.29
	P-value	< 0.00		
Friedman test		Fr = 31.96		P < 0.00
Central subfield thickness	**Pre injection**	470.70	±	99.14
	1 month post injection	386.72	±	85.92
	P-value	< 0.00		
	6 months post injection	384.64	±	97.69
	P-value	< 0.00		
Friedman test		Fr = 37.81		P < 0.00

Log MAR: logarithm of the minimal angle of resolution, BCVA: Best correlated visual acuity, p-value for comparison between pre injection and post injection

There was statistically significant improvement in the visual acuity and decrease in the central subfield thickness in opposite to the ELM disrupted group where there was no significant improvement in visual acuity otherwise, it was deteriorated, although there was decrease in the central subfield thickness but was not significant **(Table 4)**.

Table (4): Comparison between Log MAR BCVA and central subfield thickness pre injection and 1 and 6-month post injection in the ELM intact group

Parameters \ ELM		Disrupted (no=10) Mean ±SD			Intact (no=40) Mean ±SD		
Log MAR BCVA	Pre injection	0.63	±	0.31	0.73	±	0.32
	1 month post injection	0.50	±	0.21	0.48	±	0.23
	P-value	0.128			< 0.00		
	6 months post injection	0.61	±	0.23	0.38	±	0.28
	P-value	0.847			< 0.00		
Friedman test		Fr = 2.17		P = 0.388	Fr = 41.16		P < 0.00
The central subfield thickness	Pre injection	453.60	±	124.61	474.98	±	93.12
	1 month post injection	380.70	±	129.14	388.23	±	73.59
	P-value	0.098			< 0.00		
	6 months post injection	475.10	±	124.15	362.03	±	76.24
	P-value	0.756			< 0.00		
Friedman test		Fr = 3.8		P = 0.150	Fr = 43.55		P < 0.00

There was a statistically significant improvement in the visual acuity and decrease in the central subfield thickness. As regards IS/OS disrupted group, there was a significant improvement in visual acuity, and decrease in the central subfield thickness significant after one month but was not significant after 6 months **(Table 5)**.

Table (5): Comparison between Log MAR BCVA and central subfield thickness Pre injection and 1 and 6-month post injection in the IS/OS intact group

IS/OS \ Parameters		Disrupted (no=18) Mean ±SD			Intact (no=32) Mean ±SD		
Log MAR BCVA	Pre injection	0.68	±	0.30	0.73	±	0.34
	1 month post injection	0.54	±	0.22	0.45	±	0.23
	P-value	0.018			< 0.00		
	6 months post injection	0.59	±	0.24	0.33	±	0.27
	P-value	0.0269			< 0.00		
Friedman test		Fr = 1.51		P = 0.471	Fr = 41.16		P < 0.00
The central subfield thickness	Pre injection	469.89	±	101.40	471.16	±	99.48
	1 month post injection	392.94	±	101.65	383.22	±	77.25
	P-value	0.005			< 0.00		
	6 months post injection	437.33	±	125.80	355.00	±	62.35
	P-value	0.460			< 0.00		
Friedman test		Fr = 5.44		P =0.066	Fr = 47.81		P < 0.00

There was a statistically significant improvement in the visual acuity and decrease in the central subfoveal thickness. As regards positive intraretinal cyst group, there was no significant improvement in visual acuity otherwise, it was deteriorated, but there was decrease in the central subfoveal thickness significant after one month but wasn't significant after 6 month **(Table 6)**.

Table (6): Comparison between Log MAR BCVA and central subfoveal thickness pre injection and 1 and 6-month post injection in the negative intraretinal cyst group

Parameters \ Presence of Intraretinal cyst		No (no=39) Mean ±SD			Yes (no=11) Mean ±SD		
Log MAR BCVA	Pre injection	0.77	±	0.28	0.49	±	0.36
	1 month post injection	0.50	±	0.22	0.42	±	0.26
	P-value	< 0.00			0.307		
	6 months post injection	0.40	±	0.27	0.50	±	0.35
	P-value	< 0.00			0.926		
Friedman test		Fr = 39.96		P < 0.00	Fr = 0.400		P = 0.819
The central subfield thickness	Pre injection	478.87	±	101.41	441.73	±	88.86
	1 month post injection	399.44	±	89.60	341.64	±	52.90
	P-value	< 0.00			0.005		
	6 months post injection	393.10	±	96.87	354.64	±	99.19
	P-value	< 0.00			0.067		
Friedman test		Fr = 31.128		P < 0.00	Fr = 6.73		P = 0.035

The negative subfoveal neuroretinal detachment group showed that there was a statistically significant improvement in the visual acuity and decrease in the central subfoveal thickness, and as regards the positive subfoveal neuroretinal detachment group, there was significant improvement in visual acuity after one month, but was not significant after 6 months. There was insignificant decrease in the central subfoveal thickness otherwise, it was deteriorated **(Table 7)**.

Table (7): Comparison between Log MAR BCVA and central subfoveal thickness pre injection and 1 and 6-month post injection

Parameters \ Subfoveal neuroretinal detachment		No (no=39) Mean ±SD			Yes (no=11) Mean ±SD		
Log MAR BCVA	Pre injection	0.72	±	0.34	0.68	±	0.24
	1 month post injection	0.47	±	0.23	0.54	±	0.22
	P-value	< 0.00			0.009		
	6 months post injection	0.38	±	0.28	0.56	±	0.29
	P-value	< 0.00			0.168		
Friedman test		Fr =31.6		P < 0.00	Fr =3.53		P =0.172
The central subfield thickness	Pre injection	472.13	±	94.94	465.64	±	117.78
	1 month post injection	383.03	±	69.33	399.82	±	132.91
	P-value	< 0.00			0.104		
	6 months post injection	361.77	±	64.78	465.73	±	146.79
	P-value	< 0.00			0.999		
Friedman test		Fr = 42.00		P < 0.00	Fr = 1.64		P =0.441

DISCUSSION

Diabetic retinopathy (DR) is the leading cause of blindness in people under 75 years of age in developed countries. Diabetic macular edema (DME) can occur at any stage of DR, being the major cause of central vision loss in patients with diabetes mellitus (DM). The global prevalence of diabetes mellitus is predicted to increase dramatically in the coming decades, from an estimated 382 million in 2013 to 592 million by 2035 *(Guariguata et al., 2014)*. Therefore, the study of DME with the aim to prevent vision loss is of utmost importance. The understanding and characterization of DME are essential for its prevention and for the development of new targeted treatments.

Diabetic macular edema (DME) is a vision-threatening microvascular complication of diabetic retinopathy. It can occur at any stage of diabetic retinopathy and is the major cause of central visual loss in diabetic patients. Anti-VEGF has now become the first line treatment regimen of DME for its excellent visual and anatomic improvement *(Das et al., 2015)*.

Research is oriented towards identifying earlier preclinical biomarkers of microvascular abnormality in diabetic retina which is very important considering that early treatment is associated with better outcome. Novel preclinical biomarkers could also draw attention on the pathogenesis of DR *(Rosen et al., 2019)*.

Diabetic macular edema (DME), a macular thickening secondary to diabetic retinopathy (DR), results from a blood–retinal barrier defect that leads to vascular leakage and fluid accumulation. In patients with diabetes, DME is a leading cause of visual impairment and loss and has been reported in almost 30% of patients with duration of disease > 20 years *(Zhang et al., 2016)*.

DME is the most common cause of moderate vision loss. DME is believed to result from hyperpermeability of the retinal vessels, in which vascular endothelial growth factors (VEGFs) play an important role. It has been shown that monthly intravitreal injections of ranibizumab (IVR, Lucentis; Genentech, Inc., South San Francisco, CA, USA) resulted in visual acuity gain and anatomic improvement which sustained for three years *(Liu et al. 2019)*.

It is widely believed that damage or disruption of the photoreceptors can be visualized on OCT as loss of integrity of ELM, EZ and IZ bands. Attenuation, discontinuity or disruption of these bands have been reported as likely hallmarks of photoreceptor dysfunction or damage in a variety of retinal diseases *(Maheshwary et al., 2010)*.

These changes are better assessed in the absence of features that could weaken the signal intensity of the outer retinal layers, such as retinal edema, hemorrhage or media opacity *(Jain et al., 2013)*.

Our study included 50 eyes of 35 patients with central diabetic macular edema. The fifty eyes were 21(42%) right, and 29(58%) left.11 (22%) of patients had intraretinal cyst, 11(22%) of patients had subfoveal neuroretina detachment, ELM was disrupted in 10(20%), and IS/OS was disrupted in 18(36%).

The study showed that there was a statistically significant difference between the mean of log MAR BCVA and the mean central subfoveal thickness pre injection and 1-month post injection log MAR BCVA mean and the central subfoveal thickness mean. BCVA and the central subfoveal thickness continued to improve progressively until the end of the 6-month follow-up period where they were and that was statistically significant.

Also in our study, we found as regard comparison between Log MAR BCVA and central subfoveal thickness Pre injection and 1 and 6-month post injection in the ELM intact group showed that there was statistically significant improvement in the visual acuity and decrease in the central subfield thickness in opposite to the ELM disrupted group where there was no significant improvement in visual acuity otherwise, it was deteriorated, although there was decrease in the central subfield thickness but wasn't significant.

Chung and associates reported that the preservation of ELM and EZ integrity were associated with a better baseline VA and visual outcomes after one intravitreal bevacizumab injection *(Chung et al., 2012).*

El Gendy and associates reported that the spectral-domain OCT is a useful tool to evaluate foveal microstructural changes, including the IS/ OS line. Best-corrected visual acuity was more affected by the integrity of the IS/OS than CSFT in DME *(Samy El Gendy et al., 2013).*

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العوامل المنذرة بجهاز الأشعة المقطعية الضوئية فى حالات حقن الجسم الزجاجى بمادة مضادة الأوعية الدموية فى حالات الارتشاح السكرى بماقولة العين

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خلفيـــة البحـــث: الارتشـــاح الســـكرى بماقولـــة العـــين هـــو أشـــهر ســـبب لفقـــدن النظـــر فـــى مرضـــى الاعـــتلال الســـكرى. ان الاخـــتلال فـــى الحـــاجز الـــدموى الشـــبكى يـــؤدى الـــى تســـرب فـــى الأوعيـــة الدمويـــة وتـــراكم الســـوائل بماقولـــة العـــين. ان جهـــاز الأشـــعة المقطعيـــة الضـــوئية علـــى ماقولـــة العـــين يُمكِـــن مـــن التقـــاط مقـــاطع اليـــة الجـــودة لشـــبكية العـــين بطريقـــة غيـــر مؤذيـــة. ويمكـــن للجهـــاز أيضـــا رصـــد رد فعـــل المـــريض واســـتجابته لمختلـــف أنـــواع العـــلاج المســـتخدم والتـــى تعتمـــد علـــى بعـــض العوامـــل التـــى ســـوف يـــتم مناقشتها فى هذا الموضوع.

الهـــدف مـــن البحـــث: تقيـــيم مختلـــف أنـــواع اســـتجابة المـــريض لمختلـــف أنـــواع العـــلاج المســـتخدم لمـــريض الرشـــح الســـكرى بماقولـــة العـــين مـــن خـــلال التصـــوير بجهـــاز الأشـــعة المقطعية الضوئية.

المرضـــى وطـــرق البحـــث: فـــى هـــذا البحـــث, تـــم العمـــل علـــى 50 عـــين ل 35 مـــريض ســـكرى يعـــانون مـــن ارتشـــاح ســـكرى بماقولـــة العـــين وتـــم تقيـــيم الحـــالات باســـتخدام جهـــاز الأشـــعة المقطعيـــة الضـــوئية وذلـــك قبـــل اســـتخدام عـــلاج بـــالحقن داخـــل الجســـم الزجـــاجى بمـــادة مثبطـــة الأوعيـــة الدمويـــة وكـــذلك بعـــد الحقـــن بشـــهر وأيضـــا ب 6شـــهور مـــن اعطـــاء الحقن الأول.

نتـــائج البحـــث: كـــان 50 عـــين يعـــانون مـــن الارتشـــاح الســـكرى بماقولـــة العـــين 22 (44٪) مـــن الـــذكور و 28 (56٪) مـــن الإنـــاث. تراوحـــت أعمـــار المرضـــى مـــن 48 إلـــى 66 ســـنة بمتوســـط 56.48 ± 4.98، 6 (12٪) مـــنهم مصـــابون بمـــرض الســـكري مـــن النـــوع الأول و 44 (88٪) مـــن النـــوع الثـــاني، 12 (24٪) عولجـــوا بالأنســـولين، 9 (18٪) أقـــراص، و 29 (58٪) تســـتخدم كـــلاً مـــن الأنســـولين والأقـــراص للعـــلاج.

فيما يتعلق بالمراضات المصاحبة الأخرى، كان 12 (24٪) يعانون من ارتفاع ضغط الدم، و 6 (12٪) يعانون من اعتلال الكلية، و 8 (16٪) يعانون من أمراض القلب الإقفارية.

فيما يتعلق بالوذمة البقعية السكري المركزية ، كانت العيون الخمسون 21 (42٪) على اليمين، و 29 (58٪) يسار 11 (22٪) من المرضى لديهم كيس داخل الشبكية، 11 (22٪) من المرضى لديهم انفصال تحت الجلد العصبي الشبكي، غشاء الحد الخارجي في 10 (20٪)، وتعطل IS / OS في 18 (36٪).

كان هناك فرق ذو دلالة إحصائية بين متوسط سجل أفضل حدة بصرية مصححة (0.32 ± 0.71) A ومتوسط سمك الحقل الفرعي المركزي (470.70 ± 99.14) قبل الحقن ومتوسط سجل الحقن بعد شهر أفضل حدة بصرية مصححة (0.48 ± 0.23) والحقل الفرعي المركزي متوسط السماكة (386.72 ± 85.92. استمرت أفضل حدة بصرية مصححة وسمك الحقل الفرعي المركزي في التحسن تدريجياً حتى نهاية فترة المتابعة التي استمرت 6 أشهر حيث كانت (0.42 ± 0.29) و (384.64 ± 97.69) على التوالي وكان ذلك ذا دلالة إحصائية.

الاستنتاج: ان الخصائص المميزة لمختلف أنماط الارتشاح السكرى بماقولى العين فى جهاز الأشعة المقطعية الضوئية قبل الحقن يمكن أن تتنبأ بأشكال ووقت حدوث هذا الارتشاح السكرى, كذلك هذه الخصائص مع المتابعة للمريض تمكن من التخمين بمسار هذا الرشح.

الكلمات الدالة: الارتشاح السكرى بماقولة العين، جهاز الأشعة المقطعية الضوئية، الحقن داخل الجسم الزجاجى، مادة مثبطة الأوعية الدموية، العوامل المنذرة.

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