



VISUAL OUTCOME AFTER LASER TREATMENT IN DIABETIC MACULOPATHY

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ABSTRACT

INTRODUCTION: Diabetic macular edema is the most common cause of blindness specially in type 2 diabetic people. Laser treatment lessens macular edema and thereby saves the visual loss. **AIM:** To find out visual outcome after laser photocoagulation in Diabetic Macular Edema. **METHODS:** For distribution of type of maculopathy and treatment outcome 56 eyes of 50 patients were studied. Patients with ischemic maculopathy proved on Fundus Fluorescein Angiography were excluded from laser treatment. Patients with focal and diffuse macular edema were treated for focal and grid laser treatments respectively. Visual acuity was recorded pre and post laser treatment at 1 month and 3 months. **RESULTS:** In the present study of 50 patients, 38(76 %) were males and 12 (24%) were females, showing male predominance. Mean age in males was 57.36±11.65 years and in females was 56.67±10.17 years. Overall mean age was 57.52±10.81years. Diffuse macular edema was observed most predominantly (51.8%) followed by focal macular edema (37.5%) and least common was ischemic maculopathy (10.7%). At 1 month follow up after laser treatment, 9 (18%) eyes had visual acuity of 6/6-6/9, 27 (54%) had visual acuity of 6/12 – 6/36 and 14 (28%) eyes had visual acuity of ≤ 6/60. At the end of 3 months following laser treatment in eyes having diffuse and focal macular edema, in 80% eyes vision was maintained, in 14% vision decreased while in remaining 6% vision improved. **CONCLUSION:** The gold standard laser treatment can effectively help to maintain the visual acuity in patients with diabetic macular edema.

KEYWORDS : Diabetic maculopathy, Laser treatment, Visual acuity

INTRODUCTION:

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia.¹ Diabetic retinopathy (DR) is the commonest micro-vascular complication of diabetes mellitus and a leading cause of visual disability and blindness. It is also the leading cause of legal blindness between the age group of 20-60 yrs². Maculopathy in diabetes is an important cause of low vision. Diabetic macular edema (DME) is the most common cause of decreased visual acuity in patients with type II DM. Prevalence of DME is 6.81 % in diabetic population³. DME is defined as retinal thickening at or within 1 disc diameter of the center of the macula or the presence of definite hard exudates⁴. Fundus Fluorescein Angiography (FFA) plays important role in identifying ischemic maculopathy.

Despite the introduction of new and exciting medications in the treatment of diabetic macular edema, laser photocoagulation remains as the gold standard treatment⁵. Localized macular scatter or grid-pattern laser photocoagulation treatment for diffuse macular edema showed resorption of macular edema with improvement in visual acuity⁶.

The present study is undertaken to determine the visual outcome following laser photocoagulation diabetic macular edema.

METHODOLOGY:

A prospective study was conducted in the Department of Ophthalmology at a tertiary care teaching hospital located in rural area of western Maharashtra. The study was carried out for a period of two years from September 2012 to August 2014. Patients attending the Ophthalmology OPD and having visually significant maculopathy due to diabetes were included in the study. Patients with, maculopathy along with proliferative diabetic retinopathy, history of laser treatment for maculopathies secondary to conditions other than diabetes mellitus, vitreous haemorrhage, ocular disorders like

Glaucoma, Uveitis, Advanced Diabetic Eye Disease, vitreo-macular traction were excluded.

Total 50 patients of diabetic maculopathy attending the Ophthalmology OPD were included in the study. For distribution of type of maculopathy and treatment outcome 56 eyes of 50 patients were studied. Information was obtained from the selected patients using a structured proforma that included name, age, sex, occupation, height, weight, nature and duration of symptoms, history of systemic diseases like hypertension, diabetes mellitus (DM), treatment taken in past, family history of DM and addictions if any like smoking. A written informed consent was obtained from each patient for pre-laser workup procedures and special investigations like Fundus Fluorescein Angiography (FFA). They were explained about the expected visual outcome of the laser treatment and about follow-up schedule.

Clinical examination was performed in outpatient department. Blood pressure was recorded. Visual acuity was recorded with the help of Snellen's chart. Detailed anterior segment examination was done with Slit-lamp biomicroscope. Fundus examination was done using indirect ophthalmoscope and slit lamp biomicroscope with +78D/+90 D lens. Fundus photographs were taken for all patients. FFA was done in suspected cases of ischemic maculopathy after confirming normal renal function. Blood sample was collected to check for, BSL—Fasting and Post-prandial, Lipid Profile, Complete Haemogram, Renal Function Test. After evaluation, patient underwent laser treatment with frequency doubled Nd:YAG laser (532 nm). Total 50 eyes were subjected to focal and grid laser photocoagulation. Six eyes with FFA proved ischemic maculopathy were excluded from laser treatment.

Standard Laser Parameters used for macular photocoagulation-

Lens used: Mainster grid lens

Spot size: 50-100

The burn intensity for grid laser: barely visible (light gray)

Power: 80-100mw
 Duration: 100-125msec
 No. of spots: 100-250

Follow-up: Patients were examined in the follow up visits as per schedule given in the study proforma. Patients underwent visual acuity testing one and three months after the laser treatments. Pre and post laser visual acuity was recorded.

RESULTS:

In the present study, majority (36%) of them were between 51 and 60 years of age. Mean age in males was 57.36±11.65 years and in females were 56.67±10.17 years. Overall mean age was 57.52±10.81 years. (Table 2) In the present study of 50 patients, 44 (88%) patients had changes of diabetic maculopathy in one eye while 6 (12%) patients had diabetic maculopathy in both eyes. By applying Z test of difference between two proportions, there is no significant difference associated with laterality of diabetic maculopathy in this study. (Table 1)

Table No.1: Distribution of patients according to laterality

Diabetic Maculopathy	No. of patients	Percentage
Unilateral	44	88%
Bilateral	06	12%
Total	50	100%

p = 0.214, not significant. By applying Z test of difference between two proportions, there is no significant difference associated with laterality of diabetic maculopathy in this study.

Table No.2: Distribution of patients according to age and sex

Age in years	Male		Female		Total	
	No. of patients	%	No. of patients	%	No. of patients	%
< 40	0	0	2	16.66%	2	4%
40-50	9	23.68 %	1	8.33%	10	20%
50-60	14	36.84%	4	33.33%	18	36%
60-70	13	34.21%	3	25%	16	32%
>70	2	5.26%	2	16.66%	4	8%
Total	38	100%	12	100%	50	100%
Mean ± SD	57.36±1.65		56.67±1.017		57.52±10.81	

Among 50 patients, focal macular edema was found in 21 (37.5%) eyes, diffuse macular edema was found in 29 (51.8%) eyes and ischaemic maculopathy in 6 (10.7%) eyes. (Table 3) Before laser treatment, out of 50 eyes, 7(14%) eyes had visual acuity of 6/6-6/9, 34 (68%) had visual acuity of 6/12 – 6/36 and 9 (18%) eyes had visual acuity of ≤6/60. (Table 4)

Table No.3: Distribution of eyes according to type of diabetic maculopathy

Type of maculopathy	No. of eyes	Percentage
Focal	21	37.5%
Diffuse	29	51.8%
Ischaemic	6	10.7%
Total	56	100%

Table No.4: Visual acuity before Laser treatment

Visual acuity	No. of eyes	Percentage
6/6-6/9	7	14%
6/12-6/36	34	68%
≤6/60	9	18%
Total	50	100%

At 1 month follow up after laser treatment, 9 (18%) eyes had visual acuity of 6/6-6/9, 27 (54%) had visual acuity of 6/12 – 6/36 and 14 (28%) eyes had visual acuity of ≤ 6/60. At 3 months follow up after laser treatment, 8 (16%) eyes had visual acuity of 6/6-6/9, 26 (52%) eyes had visual acuity of 6/12 – 6/36 and 16 (32%) eyes had visual acuity of ≤6/60. (Table 5)

Table No.5: Visual acuity at 1 and 3 months follow up

Visual acuity	No. of eyes at 1 st month	No. of eyes at 3 rd month
6/6-6/9	9(18%)	9(18%)
6/12-6/36	27(54%)	26(52%)
≤6/60	14(28%)	15(30%)

In the present study, in 80 % eyes vision was maintained, in 6% eyes vision was improved but in 14% eyes vision was decreased. All eyes (100%) with visual acuity of 6/6-6/9 at baseline retained their vision. In the group of eyes with visual acuity 6/12-6/36 at baseline, 73.52% had retained their vision, 20.58% had decreased vision and in 5.88% vision improved. In the group of eyes with visual acuity ≤6/60 at baseline, 88.88% eyes had retained their visual acuity while 11.11% eyes had improved visual acuity. (Table 6)

Table No.6: Vision status at 3 months after laser treatment

Status of visual acuity	No. of Eyes (n=50)	Percentage
Maintained	40	80%
Improved	03	06%
Decreased	07	14%

DISCUSSION:

India is becoming one of the diabetic capitals in the world. With this ever-growing diabetic population, the complications due to diabetes are also growing. Diabetes is a known cause of micro-vascular angiopathy which leads to end organ damage. One of the organs is the eye where it leads to diabetic retinopathy. Diabetic maculopathy is the most common cause of decreased visual acuity in patients with type II DM. Diffuse macular edema is caused by extensive capillary leakage and localized edema by focal leakage from micro-aneurysms. The present study was undertaken to determine the visual outcome after laser photocoagulation in diabetic macular edema. In the present study, mean age in males was 57.36±11.65 years and in females were 56.67±10.17 years. Overall mean age was 57.52±10.81 years.

In the study by Lawson et al, the mean patient age was 58 years.7 In the study by Sander et al, the mean age of patients was 57 years.8 Mean age group of patients in the present study matches with the studies by Lawson et al, Sander et al. The study by Golubovic A included 86 patients with mean age of 61.8 years in males and 62.8 years (range 51-74 years) in females.9 Mean age group of patients in the study by Golubovic A was higher than that of present study.

In the present study of 50 patients, 38(76 %) were males and 12 (24%) were females, showing male predominance. The study by Wani J et al was showing a slight predominance of females with an overall male: female ratio of 27:29.10. In the study of Golubovic Arsovska female (55.8%) predominance was observed as compared to male (44.2%) patients, but there was no statistical significant association with its presence.9 In studies by Wani J et al, Golubovic Arsovska slight female predominance was noted while in the present study male predominance is observed. Male predominance in the present study could be due to more number of males presented themselves to the hospital than females. Study place being rural area, lack of awareness of importance of eye checkup among female population along with an element of illiteracy and other social factors could be the contributing factor for less number of female reporting to the hospital.

In the present study of 50 patients, 44 (88%) patients had changes of diabetic maculopathy in one eye while remaining 6 (12%) patients had diabetic maculopathy in both eyes. Majority of patients had unilateral involvement. However, we could not find any study reports in the literature regarding laterality of diabetic maculopathy to compare our findings. Most studies including our study show diffuse macular edema as the commonly observed type of diabetic maculopathy. Probable reasons for this could be late presentation. In the present study, 50 eyes had undergone laser treatment for diabetic maculopathy with the exception of 6 eyes with ischemic maculopathy. All patients were followed up for up to 3 months minimum for which visual acuity records were considered for study purpose. At the end of 3 months it was observed that pre-laser visual acuity was maintained in 40 eyes (80%). In 7 eyes (14%) pre-laser visual acuity was decreased and in remaining 3 eyes (6%) vision was improved. Lee and Olk in their study found that visual acuity was improved in 14.4%, did not change in 60.9% and worsened in 24.4% patients.¹¹ In a study done by Blankship there was improvement in visual acuity in 17% of patients, stationary in 52% and worse in 30% patients after laser treatment of diabetic maculopathy.¹²

Visual status findings after laser treatment of diabetic maculopathy in studies done by Lee and Olk and Blankship correlates well with the present study.

Laser treatment remains as the gold standard treatment for DME. Focal or grid-pattern laser photocoagulation treatment for diffuse macular edema showed a tendency for resorption of macular edema with improvement in visual acuity.¹³

In the present study, in 80 % eyes vision was maintained, in 6% eyes vision was improved but in 14% eyes vision was decreased. (Table 7) This shows that laser treatment has given excellent results and remains as the important treatment modality for macular edema. Probable reasons behind the decreased vision after laser treatment could be due to certain risk factors like nephropathy, duration of DM, poor compliance of patients to the treatment of risk factors like hypertension, hyperglycemia, hyperlipidemia. Also lack of efforts to reduce obesity, to stop smoking by the patients might have been contributed for decreased vision.

Table No.7: Comparison of studies of visual status after laser treatment

Visual status after laser treatment of DME	Number of Eyes (%)		
	Present study	Lee and Olk	Blankship
Vision maintained	80%	60.9%	52%
Vision decreased	14%	24.4%	30%
Vision improved	6%	14.4%	17%

CONCLUSION:

From the observations and results of the present study it is evident that, diffuse DME is the most commonly observed type of diabetic maculopathy. In majority of patients, vision was maintained following laser treatment which shows that laser photocoagulation is still gold standard modality of treatment for DME.

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