Original Article

COMPARISON OF INTRAVITREAL TRIAMCINOLONE INJECTION VS LASER PHOTOCOAGULATION IN ANGIOGRAPHIC MACULAR EDEMA IN DIABETIC RETINOPATHY

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ABSTRACT

Aims: To compare the effect of laser photocoagulation and intravitreal triamcinolone acetonide in the treatment of diabetic macular edema

Material and Methods: During the period of one year 100 patients having diabetic macular edema were enrolled in the project. Fluorescein angiography was carried out in all patients to confirm the diagnosis of macular edema Patients were randomly assigned into two groups. One group was treated with laser photocoagulation and other group was given intravitreal triamcinolone.

Observations: The patients registered in the project were in the age range of 40 to 76 years. The main outcome measures were visual acuity and macular edema on angiography. At three months patients receiving triamcinolone had better visual acuity compared to laser photocoagulation. However these findings were reversed by 12 months and laser photocoagulation remained superior to triamcinolone at the end of 1 year of follow up.

Discussion: A similar study conducted by DRCR compared laser photocoagulation to intravitreal triamcinolone for treatment of diabetic macular edema. At four months, patients receiving intravitreal triamcinolone had better visual acuity compared to laser photocoagulation. These findings were reversed by 16 months, and laser photocoagulation remained superior to triamcinolone at three-year follow-up.

Conclusion: To conclude our study showed that although intravitreal triamcinolone was successful in improving visual acuity in patients at the end of 3 months the effect was transient and in long term laser photocoagulation was more effective.

Keywords: Diabetic Retinopathy, Macular edema, Laser Photocoagulation, Intravitreal injection

INTRODUCTION

Macular edema or retinal thickening is an important manifestation of DR and the most common cause of moderate visual loss. ETDRS demonstrated that laser treatment prevented moderate visual loss (loss of 15 letters or three lines on the standard ETDRS visual acuity chart) in 24% eyes, compared to 12% in untreated controls, at 3 years.[1]

Although laser photocoagulation has been demonstrated to be beneficial in reducing further vision loss, vision that has already been decreased by macular edema usually does not improve. Identification of a treatment that could improve vision is desirable and of public health importance.

Prospective case series have demonstrated improvement of macular edema and visual acuity in eyes with refractory macular edema treated with intravitreal triamcinolone acetonide. (IVTA). The role of steroids on macular edema is based on their inhibition of inflammatory inhibitors, stabilization of blood-retinal barrier and inhibition of VEGF expression.

Studies evaluating the role of intravitreal triamcinolone acetonide have small sample size with relatively short follow up. Longer term evaluation is needed. The main adverse effects of raised intraocular pressure and increasing cataract formation have not been fully evaluated.

The aim of our study was to determine whether intravitreal triamcinolone acetonide injections produce greater benefit, with an acceptable safety profile, than macular laser photocoagulation in the treatment of diabetic macular edema

MATERIALS AND METHODS

100 eyes of 100 patients attending the OPD at M & J Institute of Ophthalmology and having Diabetic macular edema were enrolled in this project.

Detailed inclusion and exclusion criteria were followed.

Following patients were excluded from this study –

1. Presence of NO perception or projection of light.
2. Presence of any other retinal, macular or optic nerve pathology other then diabetic macular edema likely to affect visual outcome.
3. uncontrolled intraocular pressure or eyes with preexisting glaucoma
4. Active inflammation in anterior segment.
5. Patients with advanced cataractous changes, complicated pseudophakia and corneal opacities making indirect ophthalmoscopy impossible.
6. Patients with advanced renal disease making fluorescein angiography impossible.
7. Patients with previous history of intervention in form of laser or intravitreal injections.
8. Patients with macular ischemia on FFA.

Written informed consent was taken before recruiting the patients for the study. Base line examination like visual acuity, detailed anterior segment examination, slit lamp biomicroscopy and Fundus fluorescein angiography were done in all patients. Routine blood investigation like FBS, PPBS, Blood Urea and S.Creatinine were done before taking the patient for fluorescein angiography.

Any history of adverse drug reactions was ruled out before doing angiography. Macular edema was classified angiographically as focal and diffuse. Focal edema was defined as fluorescein leakage mainly originating from microaneurysms or intraretinal microvascular abnormalities at the posterior pole on angiography. Diffuse macular edema was defined by a general breakdown in the blood retinal barrier with diffuse fluorescein leakage in central macular area. In cystoid macular edema associated with diabetes mellitus late phase FFA showed dye pooling in the central fovea region in petalloid pattern. Macular ischemia was defined as enlargement of foveal avascular zone or any disruption of the peri-foveal capillary net best observed during early phase of FFA.

The patients were randomly divided into two groups:

One group (Group A) was given intravitreal triamcinolone acetonide (4 mg/0.1 ml) in one eye. The intravitreal injection was performed under topical anesthesia with proparacaine eye drops. A lid speculum was used to keep the eyelashes away from the conjunctiva. Povidone iodine 5% eye drops and antibiotic eye drops

were instilled in the conjunctiva every five minutes for three times. The injection of triamcinolone acetonide 4 mg in 0.1 ml was performed through a 26 G. needle in the inferotemporal parsplana 4 mm posterior to the limbus in phakic eyes and 3.5 mm posterior in pseudophakic eyes. After the injection, indirect ophthalmoscopy fundus examination was used to evaluate the perfusion of the central retinal artery and the intravitreal location of the triamcinolone. The patient was given sitting position for 4 hours and Acetazolamide tablets to prevent the rise of intraocular pressure post procedure.IOP was assessed after 4 hours and Fundus was examined to rule out any complication.

The second group (Group B) was given laser photocoagulation according to modified ETDRS protocol, which involved both direct treatment of microaneurysms and grid laser to areas of thickened retina only. Small laser spot sizes 50-100 microns spaced 50-100 micron apart was placed using low power setting avoiding the foveal avascular zone.

Follow up visits were scheduled one week, one month post procedure and every two monthly thereafter.

Visual acuity testing, lOP monitoring, cataract assessment, slit lamp biomicroscopy were done at each visit. Fluorescein angiography was done at 3, 9 and 12 months to assess the amount of regression of edema and look for recurrence. The main outcome measures were visual acuity and macular edema on angiography. The complications on follow up were also noted. Retreatment assessment was done every 4 months and patients were treated as required.

Figure 1: Diffuse diabetic edema on FFA

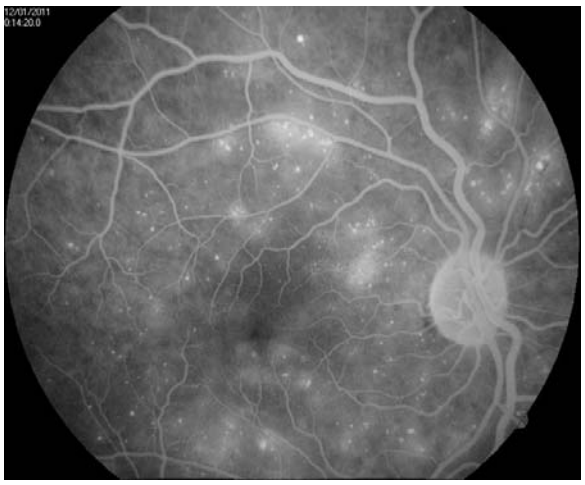


Figure 2: Cystoid macular edema

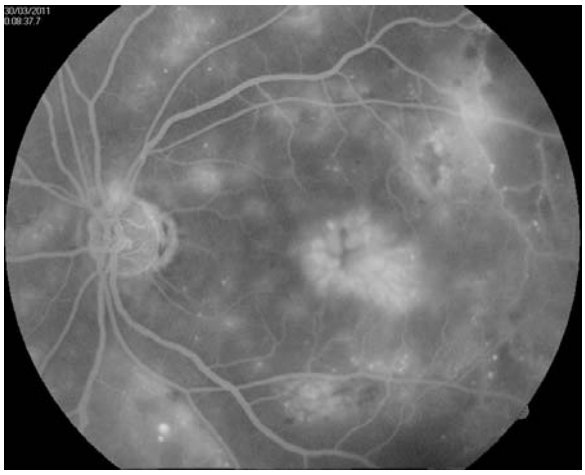
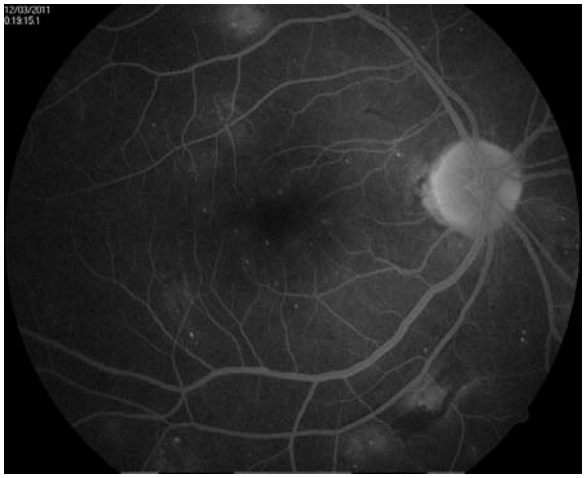


Figure 3: Focal macular edema on FFA



OBSERVATIONS

The patients registered in the project were in the age range of 40 to 76 years. Out of all 82 % of patients were of type 2 diabetes while 18 % had type 1 diabetes and 40 % patients had the disease for more than 15 years. It was observed that 48 % patients had diffuse macular edema on fluorescein angiography and 38 % showed a focal pattern of edema and 14% showed a mixed pattern.

The main outcome measures were visual acuity and macular edema on angiography. At three months patients receiving triamcinolone had better visual acuity compared to laser photocoagulation. 50% of patients treated with triamcinolone had gain in visual acuity of more than 3 lines on SNELLEN's chart as compared to 20% of patients treated with laser photocoagulation. The difference was found to

be statistically significant at 99% confidence limits.

Table 1: Clinical characteristics of study Patient

Variable	Group A	Group B	Total patients
No of patients	50	50	100
Gender			
Female	18	19	37
Male	32	31	63
Age			
40-50	10	14	24
51-60	20	17	37
61-70	8	15	23
71 and above	12	4	16
Type of diabetes			
Type 1	10	8	18
Type 2	40	42	82
Visual acuity			
6/18 TO 6/60	19	11	30
6/60 TO 3/60	25	31	56
3/60 TO HM	6	8	14
Duration of diabetes			
5-10 yrs	6	5	11
10-15 yrs	21	28	49
> 15 yrs	23	17	40
Type of macular edema			
Focal	18	20	38
Diffuse	24	24	48
Mixed	8	6	14
Visual acuity at 3 months*			
> 3 line gain	10	25	35
2 to 3 line gain	24	17	41
0 to 1 line gain	15	4	19
Loss of 1 line	1	2	3
2 to 3 lines loss	0	1	1
> 3 lines loss	0	1	1
Visual acuity at 12 months#			
> 3 line gain	28	12	40
2 to 3 lines gain	14	10	24
0 to 1 line gain	4	16	20
loss of 1 line	1	5	6
2 to 3 line loss	2	4	6
> 3 lines loss	1	3	4

Group A: Focal/grid laser photocoagulation,
Group B: 4 mg Intra-vitreal triamcinolone
*Gain in visual acuity From baseline to 3 months, #Gain in visual acuity From baseline to 12 months

However these findings were reversed by 12 months and laser photocoagulation remained superior to triamcinolone at the end of 1 year of follow up. 46% of patients in laser treated group gained 3 or more lines of vision at the end of one year as compared to 24 % patients in the triamcinolone group. The difference was statistically significant at 95% confidence limits.

Conversely 2 % of patients treated with laser lost 3 or more lines on follow up as compared to 6% of patients treated with triamcinolone.

The findings on angiography were paralled those of visual acuity.

It was found that 16% of eyes treated with triamcinolone had intraocular pressure > 21 mm hg and were put on topical glaucoma medication and 8 % of eyes had rapid progression of cataract after triamcinolone. There were no other complications like vitreous hemorrhage, retinal detachment and endophthalmitis in the triamcinolone group.

DISCUSSION

Corticosteroid therapy for macular edema-prospective case series have demonstrated improvement of macular edema and visual acuity in eyes with refractory macular edema treated with intravitreal triamcinolone acetonide. (IVTA). The role of steroids on macular edema is based on their inhibition of inflammatory inhibitors, stabilization of blood-retinal barrier and inhibition of VEGF expression. Complications of IVTA include retinal detachment, cataract progression, endophthalmitis, and vitreous hemorrhage and raised intraocular pressure.

The aim of our study was to determine whether intravitreal triamcinolone acetonide injections produce greater benefit, with an acceptable safety profile, than macular laser photocoagulation in the treatment of diabetic macular edema.

Our study showed that although intravitreal triamcinolone was successful in improving visual acuity in patients at the end of 3 months the effect was transient and in long term laser photocoagulation was more effective.

A similar study conducted by DRCR compared laser photocoagulation to intravitreal triamcinolone for treatment of diabetic macular edema. At four months, patients receiving

intravitreal triamcinolone had better visual acuity compared to laser photocoagulation. These findings were reversed by 16 months, and laser photocoagulation remained superior to triamcinolone at three-year follow-up.

In their paper, Desatnik et al. report that intravitreal injection of triamcinolone acetonide is effective in reducing foveal thickness[2] and improves visual acuity in the short term, but that visual acuity returned to pre-injection values and only a moderate reduction in foveal thickness persisted.

Massin et al.[3] prospectively evaluated the effect of a single IVTA 4 mg injection in one eye compared to the control fellow eye in 15 patients with bilateral diabetic macular edema unresponsive to laser treatment. There was a significant decrease in macular thickness in favor of the injected eye after 3 months, but that difference was no longer significant after 6 months due to recurrence of macular edema

Jonas et al. [4] conducted a large prospective comparative study on 166 eyes of 136 patients and reported a significant increase in visual acuity in eyes assigned for IVTA 20–25 mg compared to eyes assigned for laser treatment

Avitabile et al. [5] showed better visual acuity outcome and lower central macular thickness in 22 eyes that received IVTA 4 mg compared to 21 eyes that received grid laser treatment. Patelli and team[6] reported that IVTA was effective in reducing macular thickness and improving visual acuity in eyes with and without previous laser treatment, but stated that it is not yet clear whether IVTA should be considered as an initial treatment.

A study by Ockrim et all[7] to determine if repeated intravitreal triamcinolone improves best corrected visual acuity at 1 year compared with conventional laser therapy for persistent diabetic macular edema did not show a benefit from intravitreal triamcinolone over conventional laser therapy.

CONCLUSION

To conclude our study showed that although intravitreal triamcinolone was successful in improving visual acuity in patients at the end of 3 months the effect was transient and in long term laser photocoagulation was more effective.

ACRONYMS

DR- Diabetic Retinopathy
ETDRS- Early Treatment Diabetic Retinopathy Study
FFA –Fundus Fuorescein Angigraphy
IVTA- Intravitreal Triamcinolone Acetonide
CME- Cystoid Macular Edema
CSME- Clinically Significant Macular Edema
VEGF- Vaso Endothelial Growth Factors

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