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Original Research Article

EFFICACY AND SAFETY OF TRIAMCINOLONE ACETONIDE INJECTION IN SUPRACHOROIDAL SPACE IN SUBJECTS WITH DIABETIC MACULAR EDEMA

FATIMA M[*1], ABBAS S[2], SAJJAD T[1]

[1]*Department of Ophthalmology, Nishter Medical College, and University (NMU & H) Multan, Pakistan*
[2]*Department of Ophthalmology, THQ Taunsa, Pakistan*
**Correspondence author email address: drnida123@yahoo.com*

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Abstract: *This study aimed to assess the effectiveness and safety of triamcinolone acetonide administered through suprachoroidal space in subjects with diabetic macular edema. A prospective study was conducted in the Department of Ophthalmology, Nishtar Hospital, Multan, from April 2022- April 2023. A total of 40 patients with diabetic macular edema by optical coherence tomography were included in the study. During surgery, 4mg/100 µL triamcinolone acetonide was injected. The patients were followed up for a week to evaluate post-injection adverse effects. In addition, It was noted that the injection improved the VA significantly. After 6 months of follow-up, the VA was 0.69 ± 0.1 ($p<0.001$). Significant improvement was seen in optical coherence tomography measurement; after 6 months, it was reduced to 265.6 ± 39.1 µm ($p<0.001$). No significant difference was noted in intraocular pressure from baseline to follow-up. Based on the results, administering triamcinolone acetonide through suprachoroidal space in diabetic macular edema is effective without any adverse effects.*

Keywords: Diabetic Macular Edema, Suprachoroidal Space, Optical Coherence Tomography, Triamcinolone Acetonide

Introduction

Diabetes mellitus can cause a constant increase in blood sugar, leading to diabetic macular edema. DME causes retinal thickening, manifesting as visual impairment or blindness in such patients (Kim et al., 2019). DME is mostly common in patients with diabetic retinopathy.

For the treatment of DME, laser photocoagulation is performed to restore visual function, but this procedure can reduce visual field, color vision, and contrast sensitivity (Jorge et al., 2018). In contrast, intravitreal steroid injection has proved effective in treating macular edema related to eye disorders (Rittiphairoj et al., 2020). Administration of multiple doses of injections, duration of treatment, and follow-up data are less, which can lead to a high risk of complications (Eriş et al., 2019).

The supra-choroidal space is a unique passage for drug administration as it decreases drug concentration anteriorly and resultantly decreases the incidence of cataracts and elevated intraocular pressure (Naftali Ben Haim and Moisseiev, 2021). It is a pathway that can be used for intraocular drugs without IOP by using extremely small needles (0.7-1mm) that can penetrate SCS.

Triamcinolone acetonide is an injective corticosteroid with 7.5 times more efficacy as an anti-inflammatory drug than cortisone as it reduces vessel leakage. The effectiveness and safety of this drug have been proved by many trials previously. Its angiostatic action can also be effective in treating diabetic macular edema.

This study assessed the effectiveness and safety of triamcinolone acetonide administered through suprachoroidal space in subjects with diabetic macular edema.

Methodology

A prospective study was conducted in the Department of Ophthalmology, Nishtar Hospital, Multan, from April 2022- April 2023. A total of 40 patients with diabetic macular edema by optical coherence tomography were included in the study. The sample size was calculated by using Epi Info 2002. Patients with dense cataracts, vitreous hemorrhage, non-diabetic macular edema, and intraoperative complication were excluded from the study. All the patients provided their informed consent to be included in the study. The ethical board of the hospital approved the study design.

During the surgery, benoxinate was administered before the injection. In addition, 5% Betadine was administered in the lower fornix and used to clean the

eyelids. The injection site was marked by instructing patients to look down. The site was marked with calipers in the superotemporal quadrant (3.5-4 mm posterior to the limbus). 4mg/100 µL triamcinolone acetonide was injected. After the administration, the eye was washed with saline.

The patients were followed up for a week to evaluate post-injection adverse effects. In addition, routine follow-ups were done after 1 week, 1 month, 3 months, and 6 months after injection.

All the data were analyzed by SPSS version 22. Frequency and percentage were used to present qualitative data. Mean, and standard deviation was used to represent quantitative data. A probability value equal to or less than 0.05 was regarded as significant.

Results

We included 40 patients with an average age of 56.2 ± 4.8 years. 47.5% were male, and 52.5% were female Figure 1, Table I).

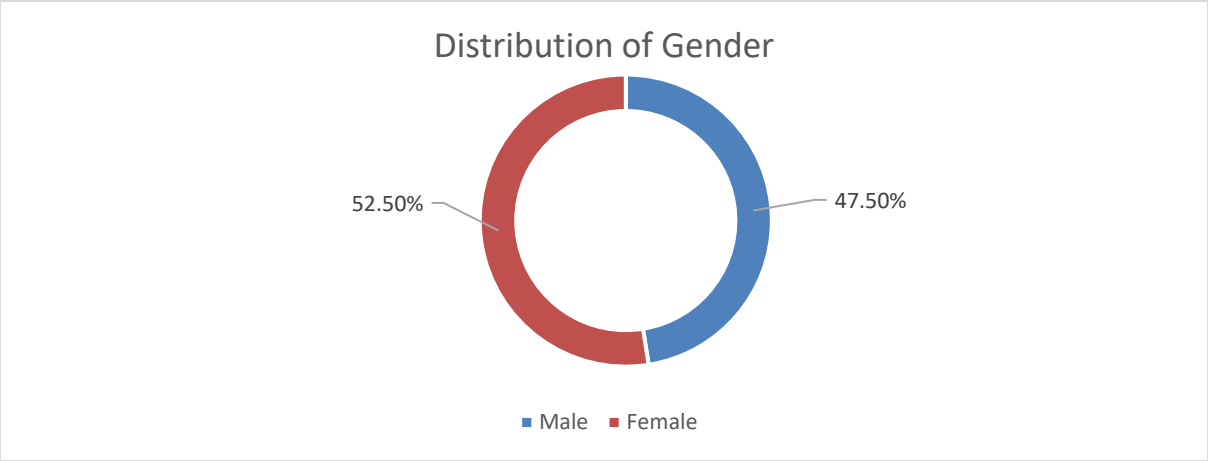

Figure 1: Gender distribution of the Papulation

While comparing the visual annuity in patients from baseline 0.79 ± 0.07 to post-injection values, it was noted that the injection improved the VA significantly. After 6 months of follow-up, the VA was 0.69 ± 0.1($p<0.001$) (Table II).

Similarly, significant improvement was seen in optical coherence tomography measurement since baseline findings 419.38 ± 63.8 µm. After 6 months, these measurements were reduced to 265.6 ± 39.1 µm ($p<0.001$) (Table III).

The results of intraocular pressure were different post-injection. The baseline pressure (14.15 ± 1.55) did slightly increase 1 week (14.5 ± 1.48) and 1 month (14.44 ± 1.28) after the injection but after 3 months (14.24 ± 1.35) and 6 months (14.8 ± 1.3) the pressure was almost equal to baseline level. Hence no significant change was noted than the baseline point (Table IV).

Table I: Baseline features of patients

Variable	N (%)
Age	56.2 ± 4.8
Gender	
Male	19 (47.5%)
Female	21 (52.5%)

Table II: Comparison of Visual acuity at baseline and post-injection

Duration	Visual acuity	P value
Baseline	0.79 ± 0.07	-
7 days after injection	0.78 ± 0.07	0.01
1 month after the injection	0.69 ± 0.07	<0.001
3 months after the injection	0.65 ± 0.1	<0.001
6 months after the injection	0.69 ± 0.1	<0.001

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Table III: Comparison of Optical coherence tomography at baseline and post-injection

Duration	OCT	P value
Baseline	419.38 ± 63.8	-
7 days after injection	389.5 ± 59.4	<0.001
1 month after the injection	336.8 ± 53.3	<0.001
3 months after the injection	299.9 ± 45.2	<0.001
6 months after the injection	265.6 ± 39.1	<0.001

Table IV: Comparison of Intraocular pressure at baseline and post-injection

Duration	IOP	P value
Baseline	14.15 ± 1.55	-
7 days after injection	14.5 ± 1.48	<0.001
1 month after the injection	14.44 ± 1.28	0.005
3 months after the injection	14.24 ± 1.35	0.2
6 months after the injection	14.8 ± 1.3	0.4

Discussion

Several studies have found that intravitreal and corticosteroid injections in the suprachoroidal space are equally effective (Hong et al., 2020). However, suprachoroidal injection is better with respect to a longer half-life and keeps a low intraocular pressure (Campochiaro et al., 2018).

Recent research has recommended administering a suprachoroidal drug through a microneedle that provides a perfect route for a minimally invasive treatment (Emami-Naeini and Yiu, 2019; Yeh et al., 2019). Our study also tested the efficacy and safety of triamcinolone acetonide in patients with diabetic macular edema.

HULK trial also evaluated the effectiveness of suprachoroidal triamcinolone acetonide combined with Aflibercept (Wykoff et al., 2018). However, there was a significant difference between optical coherence tomography results. The baseline OCT in our study was 419.38 ± 63.8; in the HULK trial, it was 473. Similarly, after 6 months, OCT was 265.6 ± 39.1, and in the HULK trial, it was 369. Our results are consistent with a study by Ali et al. (Ali et al., 2023).

No significant difference was noted between baseline intraocular pressure and IOC after follow. This is because administration of the drug in the suprachoroidal route restricts the drug to the retina and choroid, ultimately improving visual acuity and reducing macular edema. Similar to our study, Isaac et al. (Isaac et al., 2012) also noted that no significant difference was reported between baseline IOP, 4-week IOP, and IOP after 24 weeks. However, a significant change was noted at the 12-week follow-up. In our study, IOP changed significantly after 1 week and 1 month of follow.

Our study had some limitations. Our study was single-centered, with a limited sample size and study period. A multi-center study with more study participants may help in studying the working of suprachoroidal drugs more effectively.

Conclusion

Administration of triamcinolone acetonide through suprachoroidal space in patients with diabetic macular edema is effective without any adverse effects.

Conflict of interest

The authors declared the absence of a conflict of interest.

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