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EFFICACY OF SUPRACHOROIDAL TRIAMCINOLONE IN DIABETIC MACULAR EDEMA

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Abstract

Objective: To determine the mean change in best corrected visual acuity (BCVA) and central macular thickness (CMT) after injection of suprachoroidal triamcinolone in diabetic macular edema (DME). Methods: A total of 60 patients with a diagnosis of DME were included from the department of ophthalmology, Mayo Hospital, Lahore, from July 2024 to February 2025. The inclusion criteria were diabetic patients aged 18 to 70 years having DME, with best corrected visual acuity (BCVA) of less than or equal to 20/40 with no previous intervention. Triamcinolone acetonide was administered into the suprachoroidal space. Best-corrected visual acuity (BCVA) and central macular thickness (CMT) were evaluated one month following the injection. Results: The average age of the participants was 57.6 (S.D. 7.8) years. In terms of gender distribution, 34 participants (56.7%) were male, while 26 participants (43.3%) were female. The duration of DME among the participants averaged 13.4 (S.D. 5.3) years. The mean change in BVCA was reported as 0.79±0.14 from the baseline value. While mean change in CMT was measured at 17.5±7.9 µm. Conclusion: Suprachoroidal triamcinolone injection is an effective and safe treatment option for patients with DME, as it provides meaningful improvements in visual outcomes and retinal health.

INTRODUCTION

Diabetes mellitus is a widespread and ongoing health condition that significantly impacts various systems within the human body, notably including the eyes. The disease has a profound impact on the retina and lens, often resulting in severe visual impairments, including blindness.[1] The prevalence of eye-related complications associated with diabetes is rising globally, affecting both developed and developing nations. One critical complication is Diabetic Retinopathy (DR), a condition characterized by progressive damage to the corneal nerves and epithelial cells, which can further deteriorate vision.[2]

Diabetic macular edema (DME) is a significant complication associated with diabetes, and it is the leading cause of vision impairment in affected individuals. The incidence of DME is increasing rapidly, particularly among those with type 2 diabetes mellitus, which has become a widespread global health issue.[3] Currently, approximately 382 million people worldwide have diabetes, a number projected to grow to about 592 million by 2035 and over 783 million by 2045.[4, 5] This rise is largely driven by increasing obesity rates and extended human lifespan. Additionally, studies indicate that roughly 10.2% of a

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sample of 22,896 diabetic patients experienced diabetic retinopathy, and about 6.81% suffered from DME.[3, 6]

Currently, anti-VEGF medications along with steroids are the primary treatments employed for diabetic macular edema. However, in patients who have undergone vitrectomy, the removal of the vitreous humor significantly shortens the effective duration of anti-VEGF drugs compared to steroids like the dexamethasone implant.[7, 8] This indicates that steroids may be more effective than anti-VEGF agents in managing diabetic macular edema in vitrectomized eyes. Despite their benefits, intravitreal treatments with steroids can lead to notable side effects such as increased eye pressure and secondary glaucoma.[7, 9]

The aim of the present study was to determine the mean change in BCVA and CMT after injection of suprachoroidal triamcinolone in diabetic macular edema.

METHODS:

A total of 60 patients with a diagnosis of DME were included from the department of ophthalmology, Mayo Hospital, Lahore, from July 2024 to February 2025. The inclusion criteria were diabetic patients aged 18 to 70 years having DME, with best corrected visual acuity (BCVA) of less than or equal to 20/40 with no previous intervention. Patients with IOP >21 mmHg, uveitis, macular ischemia, and ME secondary to other causes were excluded. Informed consent was obtained from each patient.

Triamcinolone acetonide was administered into the suprachoroidal space through a specific injection technique. A volume of 0.1 ml was injected using a 30-gauge syringe equipped with a BD ultrafine needle. Essential supplies included a 24-gauge intravenous cannula and an injection solution of triamcinolone acetonide at a concentration of 40 mg/ml. Prior to the injection, all patients underwent dilation, and an indirect ophthalmoscope was prepared for posterior segment examination post-injection. The procedure involved first removing the needle from the cannula, which was then modified to expose only 1000 µm of the syringe tip. Triamcinolone was drawn into the syringe up to the 0.1 ml mark. To prepare the surgical field, the eye was cleansed with a 10% povidone-iodine solution, and a 5% solution was instilled into the conjunctival fornices, remaining for 30 seconds. The eye was draped similarly to other intraocular procedures. An incision of 3.5 mm was made in the supratemporal quadrant starting from the limbus. Following precise marking, 4 mg of triamcinolone acetonide (0.1 ml) was injected into the suprachoroidal space by inserting the needle perpendicular to the sclera, with the bevel facing backwards at a distance of 3.5 mm from the limbus. The needle was carefully retracted afterward, and a cotton-tipped applicator was placed over the injection site to minimize any reflux. Best-corrected visual acuity (BCVA) and central macular thickness (CMT) were evaluated one month following the injection. BCVA assessments were conducted using the standard Snellen chart, allowing for a comparison of visual acuity before and one month after the procedure. CMT was measured utilizing spectral domain optical coherence tomography (SD-OCT), with assessments being made at both baseline and one month post-injection.

RESULTS:

The baseline characteristics of the study participants were summarized in Table 1. The average age of the participants was 57.6 (S.D. 7.8) years. In terms of gender distribution, 34 participants (56.7%) were male, while 26 participants (43.3%) were female. The duration of DME among the participants averaged 13.4 (S.D. 5.3) years.

The mean change in BVCA was reported as 0.79±0.14 from the baseline value. While mean change in CMT was measured at 17.5±7.9 µm (Table 2).

Table 1. Baseline Characteristics.

Age (Y)	57.6±7.8
Gender	
Male	34 (56.7%)
Female	26 (43.3%)
Duration of DME (years)	13.4±5.3

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Table 2. Mean change in BVCA and CMT.

BVCA	0.79±0.14
CMT (µm)	17.5±7.9

DISCUSSION:

DME remains a significant clinical challenge, frequently resulting in vision impairment among individuals with diabetes.[10] The primary treatment approach involves the use of anti-VEGF agents, which have become a cornerstone in managing this condition. However, the widespread adoption of this therapy is often hindered by its high cost and the necessity for frequent injections, which can impact patient compliance and overall treatment effectiveness.[11]

Suprachoroidal injection of triamcinolone acetonide is an emerging technique for treating various retinal vascular conditions. Research in animal studies indicates that delivering drugs via this method results in high concentrations within the posterior segment of the eye. Meanwhile, the drug's presence in the anterior chamber remains minimal, offering a targeted approach with reduced anterior segment exposure.[12]

This research aimed to evaluate the safety and effectiveness of a treatment, responding to the critical demand for alternative strategies to manage the condition. The findings indicated a mean change in Best Visual Corrected Acuity (BVCA) of 0.79 ± 0.14, and a change in central macular thickness (CMT) of 17.5 ± 7.9 micrometers following the administration of triamcinolone acetonide via suprachoroidal injection.

Several studies have explored a variety of treatment options for diabetic macular edema (DME). In one such study, Tayyab and colleagues analyzed the outcomes of subthreshold retinal laser therapy (SCTA). They found that the average central macular thickness (CMT) at the start was 248.5 micrometers, with a standard deviation of 122.6 micrometers. After 12 months, the mean CMT decreased to 230.1 micrometers, with a standard deviation of 47.5 micrometers, indicating an average reduction of 18.4 micrometers. Regarding visual acuity, the mean best corrected visual acuity (BVCA) at baseline was 1.194, with a standard deviation of 0.1. At the 12-month follow-up, the mean BVCA improved to 0.44, with a standard deviation of 0.1, reflecting an average gain of approximately 0.754.[13]

In a study conducted by Abdelshafy Tabl et al., the effects of 4 mg of suprachoroidal triamcinolone acetonide were compared to 4 mg of intravitreal triamcinolone acetonide (IVT). After three months, the change in best corrected visual acuity (BCVA) showed no significant difference between the two treatment groups, with the IVT group averaging 0.9 logMAR (ranging from 0.8 to 0.9) and the suprachoroidal group averaging 0.8 logMAR (with a range of 0.6 to 0.9), yielding a P-value of 0.313. However, there was a notable difference in central foveal thickness (CFT), which was significantly higher in the IVT group, measuring 385 ± 72 µm compared to 323 ± 54 µm in the suprachoroidal group, with a P-value of 0.028. Additionally, the increase in intraocular pressure (IOP) was more pronounced in the IVT group at the three-month mark, with an elevation of 5 mm Hg, whereas the suprachoroidal group showed no increase in IOP. Moreover, recurrence of diabetic macular edema (DME) occurred more rapidly in patients receiving IVT triamcinolone acetonide, with 70% of these patients experiencing a recurrence, compared to only 30.8% in the suprachoroidal treatment group.[14]

Research conducted in preclinical settings indicates that administering drugs via the suprachoroidal space, particularly triamcinolone acetonide (TA), results in a more targeted delivery. This method allows for increased concentrations of the drug to reach the retina, choroid, and retinal pigment epithelium, while minimizing exposure to the anterior segment of the eye.

This study has certain limitations, including a limited sample size, a brief follow-up period, and the absence of a control or comparison group. Despite these constraints, the suprachoroidal route for drug administration has proven to be an effective and safe method, with potential applications beyond diabetic macular edema (DME) in treating various retinal diseases. We advise a careful and controlled approach when considering SCTA, recommending that surgeons gain sufficient familiarity with the injection

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technique prior to its widespread adoption for diverse retinal conditions.

CONCLUSION:

Suprachoroidal triamcinolone injection is an effective and safe treatment option for patients with DME, as it provides meaningful improvements in visual outcomes and retinal health.

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