OUTCOME OF SUPRACHOROIDAL TRIAMCINOLONE INJECTION IN THE TREATMENT OF CHRONIC MACULAR EDEMA SECONDARY TO RETINAL VEIN OCCLUSIONS

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ABSTRACT

Objective: To assess the safety and preliminary efficacy of supra-choroidal triamcinolone injection in chronic and refractory macular edema secondary to retinal vein occlusions.

Methods: This was a prospective study designed as 8-weeks, single-centered, non-randomized clinical study. Twelve eyes of 11 patients were studied. Out of 11 patients, 4 (36.36%) were male and 7 (63.64%) were female. One female patient had bilateral Branch Retinal Vein Occlusions (BRVOs). Out of the other 10 patients, 6 were BRVOs and 4 were Central Retinal Vein Occlusions (CRVOs). Study included only those eyes in which the macular edema was chronic (of at least one-year duration) or was found to be resistant to anti-VEGFs treatment. A single injection of Triamcinolone Acetonide 4mg/ 0.1 ml was injected into the supra-choroidal space and follow-up obtained for 8 weeks. Best Corrected Visual Acuity (BCVA), Intra-ocular Pressure (IOP), Central Macular Thickness (CMT) on Optical Coherence Tomography (OCT) and any adverse effect related to the injection during the course of study were recorded as Pre-injection (baseline), 2-weeks post-injection and 8-weeks post-injection.

Results: Overall mean BCVA improved from 1.0 to 0.5 LogMAR. Mean baseline (pre-injection) CMT was 578 microns (SD +/- 126 µ) which improved to 399 microns (SD +/- 132 µ) at 8-weeks post-injection. No statistically significant elevation in IOP was noted after injection.

Conclusion: A single suprachoroidal injection of Triamcinolone Acetonide is fairly safe and effective in significant percentage of cases of chronic and refractory macular edema secondary to retinal vein occlusions (both central and branch).

Keywords: Suprachoroidal injection, Triamcinolone Acetonide, Retinal vein occlusion.

INTRODUCTION

Retinal Vein Occlusion (RVO) is the second most common cause of retinal ischemia after Diabetic Retinopathy.[1] Macular Edema (ME) is the most common vision threatening pathology in patients with Retinal Vein Occlusion (both central and branch).[2] The etiology of this Macular edema is multi factorial and is associated with the release of inflammatory mediators and VEGF. Consequently, there is inflammation, ischemia, cystoid changes and irreversible loss of macular function. Due to multi-factorial etio-pathogenesis, treatment of ME in Vein Occlusion cases has been difficult and challenging.[3]

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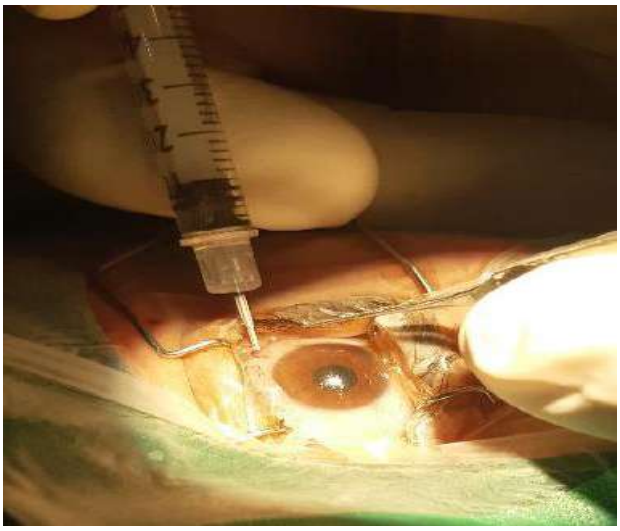
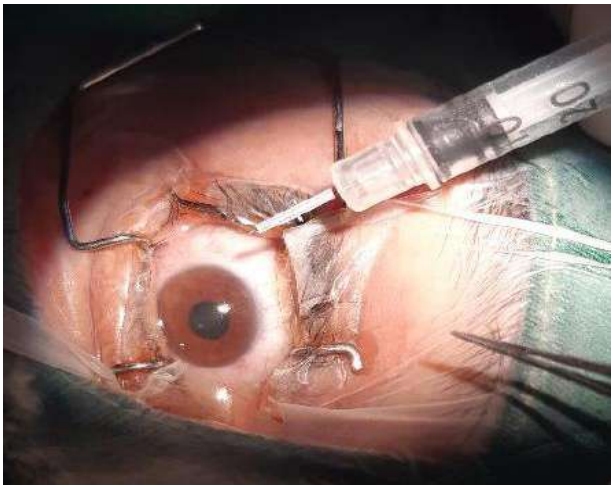
Now a days, Intravitreal injection of anti-vascular endothelial growth factor (Anti-VEGFs) is considered to be the first line treatment in Macular edema secondary to Retinal Vein Occlusions. Before the era of Anti-VEGF agents, intravitreal Triamcinolone Acetonide (IVTA) was the mainstay treatment for many vitreo-retinal pathologies including RVOs- related Macular Edema and Diabetic Macular Edema (DME). Intravitreal Triamcinolone Acetonide stabilizes the blood retinal barrier through the mechanism of regulation of VEGF and other factors.[4, 5]

Intra-vitreal Triamcinolone although an effective treatment modality in chronic, anti-VEGFs resistant macular edema, is associated with side effects and complications like vitreous precipitates, cataract, glaucoma and sterile Endophthalmitis, etc. Injection of Triamcinolone in the suprachoroidal space theoretically has the potential of increased drug efficacy due to direct retinal and choroidal absorption. Also, as the crystalline lens, the trabecular meshwork and the vitreous are by-passed, the chances of potential complications of the intra-vitreal route of Triamcinolone injection can be reduced.[6]

MATERIALS AND METHODS

This was a prospective study designed as 8-weeks, single-centered, non-randomized clinical trial performed to assess the safety and preliminary efficacy of a single suprachoroidal Triamcinolone Acetonide (TA) injection in cases of chronic and/or anti-VEGFs refractory Macular Edema secondary to Central or Branch Retinal Vein Occlusions (CRVO/ BRVO). A total of 12 eyes of 11 patients were studied between 10th September 2021 and 10th March 2022. Study protocol was approved by the institutional ethical committee. All participants provided informed consent. Study included only those eyes in which the Macular Edema was chronic or was found to be resistant to anti-VEGFs treatment (Central Macular Thickness not significantly improving despite at least 6 anti-VEGF injections in the last one year).





A single Triamcinolone Acetonide (with the trade name of Kenacort by Bristol-Myers Squibb) 4mg in 0.1 ml was injected into the supra-choroidal space and follow-up obtained for 8 weeks. Injection was performed with a 30-guage needled insulin syringe (Omnican N-100 by B-braun) having a piece of 23-guage IV cannula part sleeved on the syringe needle (working as a stopper) leaving 1mm bare tip. The 0.1 ml of Triamcinolone was injected 4 mm from the limbus directly into the suprachoroidal space.

The Best Corrected Visual Acuity (BCVA), Central Macular Thickness (CMT) measured with OCT and the Intra-ocular Pressure (IOP) was determined during the 8-weeks follow up period.

RESULTS

Twelve eyes of 11 patients were enrolled. Out of 11 patients, 4 were male and 7 were female. One female patient was having bilateral Branch Retinal Vein Occlusions (BRVOs). Out of the other 10 patients, 6 were BRVOs and 4 were CRVOs (Table-1).

Table 1. Demographic distribution

Age range (Years)	**Gender**		**Vascular occlusion**	
	Male	Female	BRVO	CRVO
41-50	1 (9.09%)	1 (9.09%)	2 (16.67%)	0
51-60	1 (9.09%)	3 (27.27%)	3 (25.00%)	2 (16.67%)
61-70	2 (18.18%)	3 (27.27%)	3 (25.00%)	2 (16.67%)

All the patients enrolled had chronic Macular edema of at least one-year duration. BCVA was documented before injection, 2-weeks post-injection and 8-weeks post-injection. In all patients, spectral

domain OCT (Spectralis by Heidelberg Engineering) for the Macula was performed before injection and also at the two follow-up visits. The Foveal cuts were selected for the comparison. Mean baseline (pre-injection) Central Macular Thickness (CMT) was 578 microns (SD +/- 126 µ) (Table 2).

Table 2. Mean Visual acuity, corneal thickness and Intra-ocular Pressure

	Pre-injection	**2-weeks post injection**	**8-weeks post injection**	**P-value**
Mean Visual acuity (LogMAR)	1.0	0.8	0.5	0.432
Mean IOP (mmHg)	16 (+/- 2.4)	18 (+/- 2.7)	17 (+/- 1.8)	0.036
Mean CMT (microns)	578 +/-126 µ	486 + 137 µ	399 + 132 µ	0.017

In all patients, Intra-ocular Pressure was recorded before injection (baseline), at 2-weeks and 8-weeks follow up visits. IOP was measured by Goldmann's Applanation Tonometer. All the injections, OCTs and IOP measurements were carried out by a single Ophthalmologist.

Data were entered and analyzed through SPSS (version 20). Descriptive statistics were recorded in terms of percentages and frequencies for categorical data and means and standard deviation for numerical data.

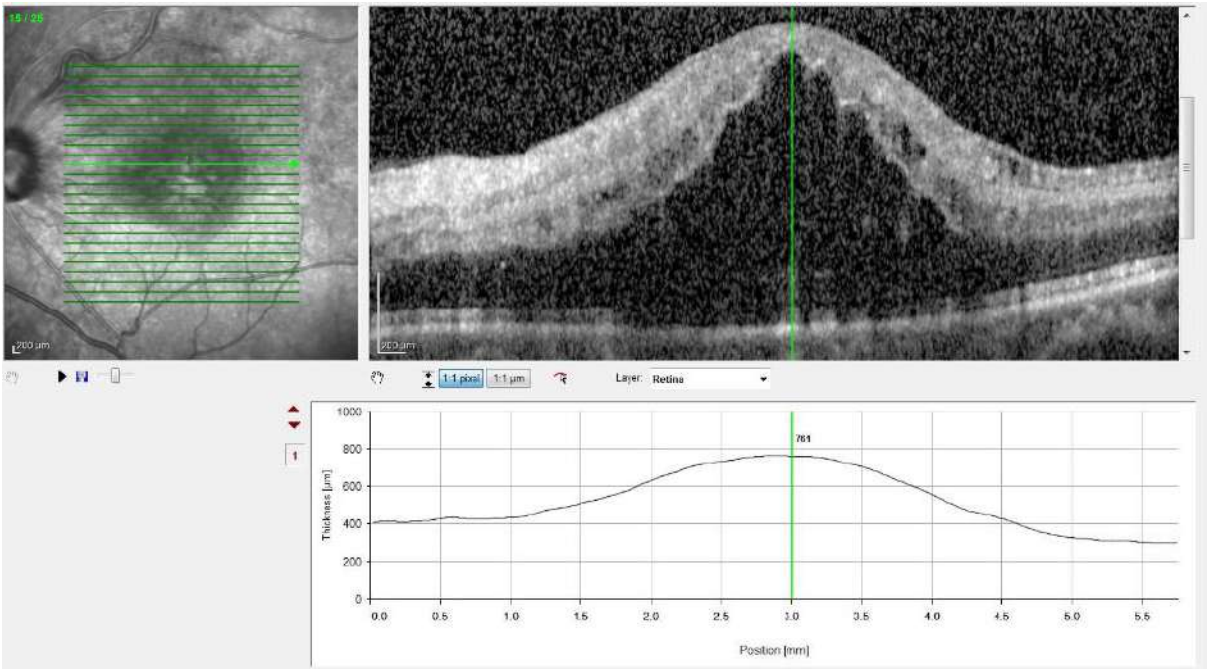


Figure 1: OCT showing macular edema (increased CMT) secondary to retinal vein occlusion

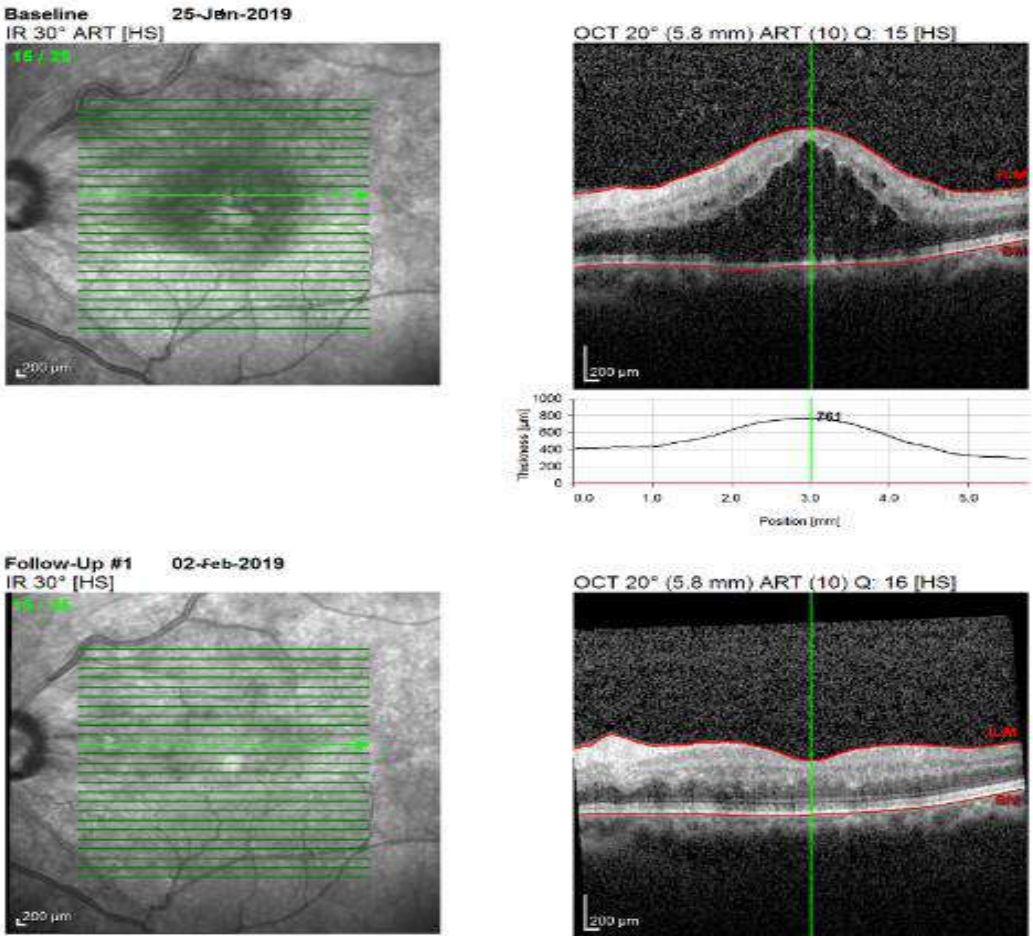


Figure 2: OCT showing reduction in CMT before and one week after suprachoroidal injection of triamcinolone acetonide

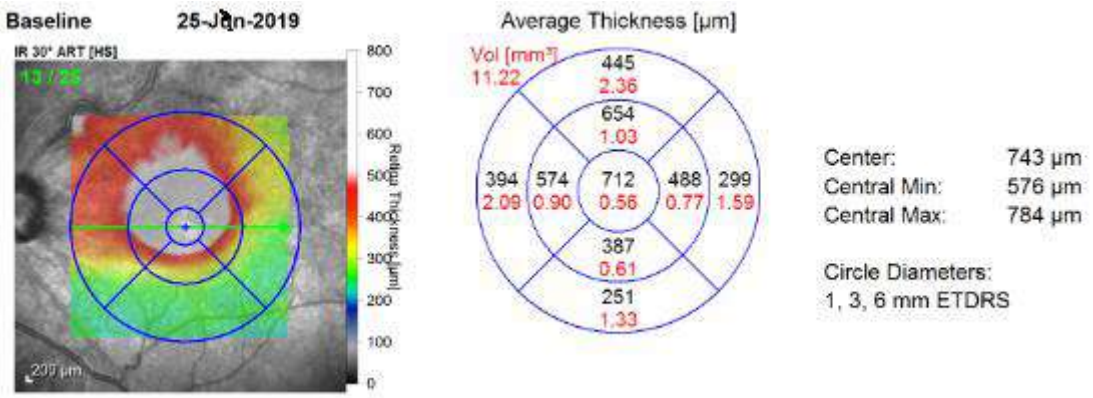


Figure 3: OCT showing increased CMT secondary to retinal vein occlusion

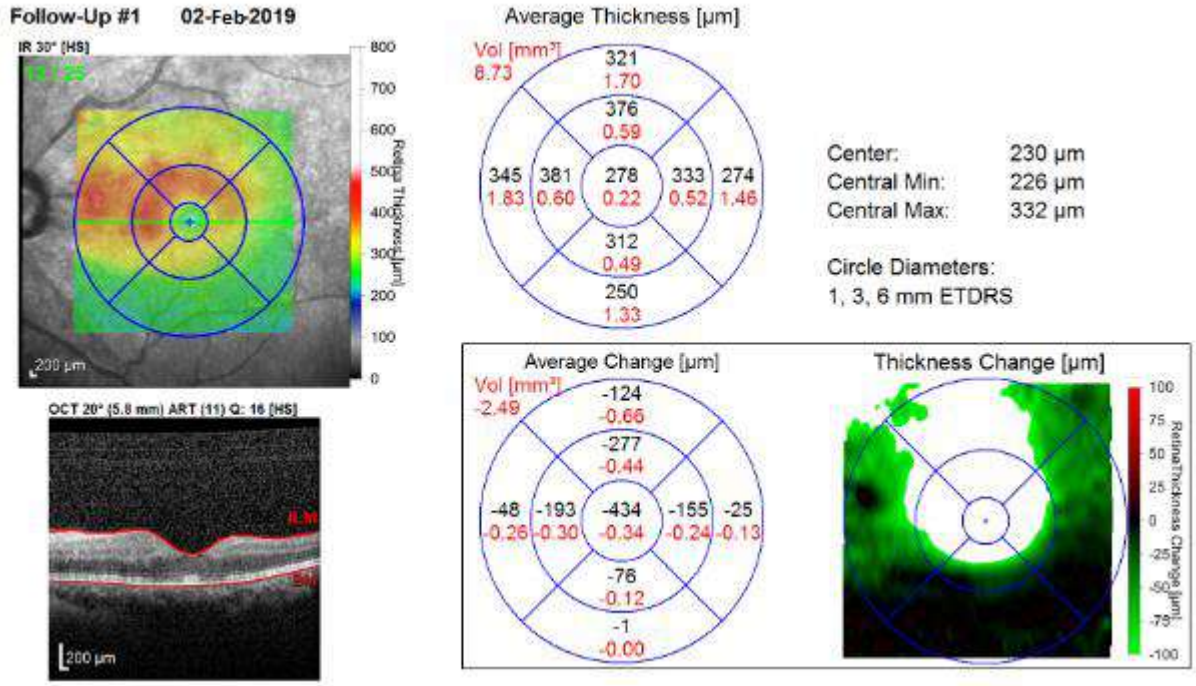


Figure 4: OCT of same eye one week after suprachoroidal triamcinolone, showing reduction in CMT

DISCUSSION

This study supports the theoretical concept that supra-choroidal administration of Triamcinolone Acetonide injection in chronic and certain anti-VEGFs resistant macular edema (Retinal Vein Occlusion related) is safe and effective in reducing the central macular thickness on Optical Coherence Tomography.

Previously few other studies have shown similar results of suprachoroidal triamcinolone injection causing significantly improved BCVA and decreasing CMT in patients with macular edema secondary to retinal vein occlusions.[7,8,9]

This small sampled study showed that a single suprachoroidal Triamcinolone injection was well tolerated. No systemic side effects were noted. Most of the side effects were ocular and mild like redness, irritation and pain. Not a single eye was found to get raised IOP to the extent needing pressure lowering medications during the 8 weeks follow-up. On the other hand, in the intra-vitreal injection of Triamcinolone Acetonide (IVTA) for the same indication, about 25% of the eyes had IOP rise more than 10 mmHg needing temporary IOP lowering topical medications mostly during 8 weeks post-injection period.[10]

There was statistically significant improvement from baseline BCVA in 9 eyes out of 12 from mean LogMAR 1.0 to 0.5 at 8-weeks post-injection follow-up visit. This is comparable with other studies conducted on the same subject.[11] Amongst the studied eyes, 11 out of 12 (91.67%) had at least 50-µm reduction in Central Macular Thickness at 8 weeks post injection (mean CMT reduction was 179-µm). No statistically significant elevation of IOP was noted from the baseline after injections which might have needed anti-glaucoma medications. Except for mild pain, discomfort, watering and lacrimation, no untoward sided effects were recorded after injections.

CONCLUSIONS

A single suprachoroidal injection of Triamcinolone Acetonide is fairly safe and effective in significant percentage of cases of chronic and refractory macular edema secondary to branch or central Retinal Vein Occlusions.

This study did not provide significant evidence to justify its routine use in clinical practice for all patients with macular edema in Vein Occlusions. A randomized clinical trial on this issue would provide more conclusive evidence and help identify those patients most likely to benefit from suprachoroidal triamcinolone acetonide.

DECLARATIONS

Authors contributions:

1. Muhammad Tariq Khan: Data collection, conceived and designed analysis.
2. Imran Ahmed: Data contribution and manuscript writing.
3. Ahmed Usman Khalid: Analysis and proof reading.

Conflicts of interests:

Authors have no conflict of interest in this article.

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