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Original Article

Effect of Supra-Choroidal Triamcinolone Injection on Best-Corrected Visual Acuity and Central Retinal Thickness in Patients with Macular Edema Secondary to Retinal Vein Occlusion

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ABSTRACT

Purpose: To find out the effect of suprachoroidal Triamcinolone injection on best corrected visual acuity (BCVA) and central retinal thickness (CRT) in patients with macular edema secondary to retinal vein occlusion.

Study Design: Interventional case series.

Place and Duration of Study: College of Ophthalmology and Allied vision Sciences, Ophthalmology department, Unit II Mayo hospital, Lahore, from September 2019 to January 2020.

Methods: This study included 45 patients diagnosed with unilateral, retinal vein occlusion associated with macular edema. Patients with previous anti-vascular endothelial growth factor injection or any steroid injection received in the last 3 months or macular edema due to any other cause were excluded from the study. Only one eye of each patient was enrolled. The patients were treated with suprachoroidal triamcinolone injection (4 mg/ 100µL concentration). Patients with baseline central retinal thickness (CRT) of > 300 µm were included in the study. Serial changes in this parameter were evaluated at 1 week, 1 month and 3 months after suprachoroidal triamcinolone injection. Final CRT and Best-corrected visual acuity (BCVA) was recorded after three months.

Results: Out of 45 patients, 26 (57.7%) were males and 19 (42.2%) were females. Majority of the patients (35.4%) were 51–60 years old. During first week the visual acuity was 0.321 ± 0.273 LogMAR, after one month it was 0.468 ± 0.291 and 0.406 ± 0.318 after 03 months with a p value of 0.003. After three months significant decrease in CRT was observed. With a p-value of 0.002.

Conclusions: Suprachoroidal injection significantly improves BCVA and decreases CRT in patients with macular edema due to retinal vein Occlusion.

Keywords: Retinal vein occlusion, suprachoroidal injection, triamcinolone acetonide.

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INTRODUCTION

Among the leading causes of retinal vascular disorders is Retinal vein occlusion. Reason for macular edema and vision loss include retinal vascular congestion, endothelial damage, epithelial tissue damage and inflammatory cytokines in patients with BRVO and CRVO (branch and central retinal vein occlusion). Current treatment of choice for macular edema

associated with RVO include anti-vascular endothelial growth factor agents or steroids.[1]

In both BRVO and CRVO, macular edema (ME) is the commonest complication and is a definite cause of significant loss of vision in both cases.[2,3] The basic pathogenesis of macular Edema in such cases is abnormal blood vessels due to release of cytokines (such as VEGF and interleukins), and cellular inflammatory mediators (such as inter cellular adhesion molecule).[4] All of these lead to retinal ischemia that ultimately compromises retinal function. Our abilities are limited to measure these mediators in vivo. However, ME (in the form of central retinal thickness) can be gauged with optical coherence tomography (OCT).[5]

Decrease in central retinal thickness (CRT) is taken into account as a measure of the treatment success and is associated with improvements in BCVA. In GENEVA trial it has been established that the utilization of OZURDEX (Dexamethasone Implant) is associated with improvements in macular edema caused by central retinal vein occlusion and branch retinal vein occlusion. In both cases the CRT and BCVA was improved.[6,7]

In HULK trial, it was established that using Suprachoroidal triamcinolone injection in Diabetic Macular Edema resulted in improvement in BCVA and decrease in CRT with low rate of adverse effects. However, treatment naïve eyes showed better BCVA than those which were previously treated for diabetic macular edema (with anti- VEGF or lasers).[8]

Suprachoroidal injection of steroids minimizes the amount of steroids in anterior chamber of the eye while therapeutic effect of the drug on retina is good. The adverse effects of steroids for example cataract and glaucoma are minimal.[9]

As data in this regard is scarce in our setup, we tried to find out the effects of suprachoroidal Triamcinolone injection on BCVA and CRT.

METHODS

This study was conducted in Ophthalmology department Unit II, Institute of Ophthalmology, Mayo hospital Lahore. All patients provided informed consent before performing the procedure. Institutional review boards approved the study and data was collected from August 2019 to January 2020. We evaluated 45 patients diagnosed with unilateral, retinal vein occlusion associated with macular edema. Patients with retinal vein occlusion of less than/equal to 12 months duration, BCVA (best corrected visual acuity) of 20/50 to 20/200 and CRT of more than 300 µm as measured by OCT were included in the study. Patients with previous anti-vascular endothelial growth factor injection or any steroid injection received in the last 3 months or macular edema due to any other cause were excluded from the study. Only one eye of each patient was enrolled.

Complete history was taken and Ocular examination was performed which included BCVA, IOP, slit lamp examination and Fundoscopy. ME (macular edema) as a result of Retinal Vein Occlusion was assessed by EDI-OCT (Enhanced depth imaging optical coherence tomography). Each Patient received one suprachoroidal injection of Triamcinolone suspension of 4 mg/100 µL concentration. Disposable 1 mL syringes with 30 gauge needle attached via Luer lock microinjector (Clear side Biomedical Inc. Alpharetta, GA) were used for suprachoroidal injections.[6] The injection side was 4 mm behind the limbus about 200–300 µm anterior to retina. The follow-up examinations were scheduled to be on 1 week, one month and 3 months.

RESULTS

Out of 45 patients 26 (57.7%) were males and 19 (42.2%) were females. Results of table 1 show the age distribution of 45 patients.

Table 1: *Age Distribution of Participants.*

Age Distribution	Percentage
30 — 40 Years	19.6%
41—50 Years	21.1%
51— 60 Years	35.4%
16 — 70 Years	24.3%

Table 2: *Comparison of Variables at Different Times of Followup.*

Baseline	1 Week	1 Month	3 Months	P value
BCVA (LogMAR)	0.321 ± 0.273	0.468 ± 0.291	0.406± 0.318	0.003
CRT, um	325.1 ± 74.2	305.2 ± 89.3	289 ± 47.5	0.002

Mean pre-injection visual acuity was 0.241±0.254 LogMAR and post injection visual acuity was 0.406 ±

0.318 LogMAR. There was a significant improvement in visual acuity after the injection with a p value of 0.003, which was statistically significant. Mean pre injection CRT was 342.2 ± 40.2 um and post injection CRT was 289 ± 47.5 um with a p value of 0.002, which was also statistically significant.

DISCUSSION

There are multiple causes of ME due to RVO that include ischemia, turbulent flow at the arteriovenous crossing and other vessel wall characteristics that cause instability of fluids in the vessels.[5] Different modes of drug delivery to the retina have been in use. The usual treatment of ME after RVO is by anti-VEGF injections given monthly,[6] substituted by intravitreal steroids[7] in those cases where anti-VEGF has not been responding or is contraindicated. However, these intravitreal steroids have potential complications.

Drug delivery to suprachoroidal space is important as it can maximize the drug delivery to retina and other posterior segment tissues while minimizing the drug exposure to anterior chamber and lens avoiding the potential complications.[10] In this particular study, better visual and anatomical results were seen after 3 months follow-up with respect to baseline BCVA and CRT after suprachoroidal injections of triamcinolone. Recent reports suggested that CRT decreases and significant improvement in BCVA occurs in patients with ME secondary to retinal vein occlusion.[11] In patients with RVO and ME, the choroidal thickness was also increased which was reduced with suprachoroidal injection. However there are also some reports of choroidal thinning after intravitreal steroid and anti-VEGF injections.[12,13]

Studies have shown that intravitreal steroid injections cause raised IOP.[14] After suprachoroidal injection, the drugs get rapidly dispersed in the suprachoroidal space and this leads to minimal change in aqueous humor drainage or production.[15] Thus the side effects associated with other modes of delivery of steroids are minimized by this method.[16.17]

Other studies have also shown many benefits of this drug delivery method which include less chance of IOP elevations, negligible incidence of glaucoma and cataract and more sustained release of drug at potential action site.[18,19] Nevertheless, further investigation is the need of time as this is a new drug delivery method.[20]

A study was conducted to treat ME in RVO with combination of suprachoroidal injection of triamcinolone and intravitreal aflibercept. It was concluded that this combination had superior results as compared to intravitreal aflibercept alone in 3 months follow-up in terms of CRT and visual acuity improvements.[21] Our results were approximately same at 3 months follow-up without Aflibercept.

Limitations of this study are it was not a comparative study. We have presented a case series of small sample. Follow up was also only for three months. Further studies are needed to see the effects of multiple injections of Triamcinolone with longer follow-ups.

Ethical Approval

The study was approved by the Institutional review board/ Ethical review board**. (EY-11/93/MH)**

Conflict of Interest

Authors declared no conflict of interest.

REFRENCES

1. **Ho M, Liu DT, Lam DS, Jonas JB.** Retinal Vein Occlusions, From Basics to the Latest Treatment. Retina, 2016; **36 (3):** 432–448.
2. **Mitchell P, Smith W, Chang A.** Prevalence and associations of retinal vein occlusion in Australia. The Blue Mountains Eye Study. Arch Ophthalmol. 1996; **114 (10):** 1243–1247.
3. **Rogers S, McIntosh RL, Cheung N, Lim L, Wang JJ, Mitchell P, et al.** The prevalence of retinal vein occlusion: pooled data from population studies from the United States, Europe, Asia, and Australia. Ophthalmology, 2010; **117 (2):** 313–9.e1.
4. **Klein R, Klein BE, Moss SE, Meuer SM.** The epidemiology of retinal vein occlusion: the Beaver Dam Eye Study. Trans Am Ophthalmol Soc. 2000; **98:** 133–41. Discussion, 141-3.
5. **Ehlers JP, Fekrat S.** Retinal vein occlusion: beyond the acute event. Surv Ophthalmol. 2011; **56 (4):** 281–299.
6. **Goldstein DA, Do D, Noronha G, Kissner JM, Srivastava SK, Nguyen QD.** Suprachoroidal Corticosteroid Administration: A Novel Route for Local Treatment of Noninfectious Uveitis. Transl Vis Sci Technol. 2016; **5 (6):** 14.

7. **Cekiç O, Chang S, Tseng JJ, Barile GR, Del Priore LV, Weissman H, et al.** Intravitreal triamcinolone injection for treatment of macular edema secondary to branch retinal vein occlusion. Retina, 2005; **25 (7):** 851–855.
8. **Chen CH, Chen YH, Wu PC, Chen YJ, Lee JJ, Liu YC, et al.** Treatment of branch retinal vein occlusion induced macular edema in treatment-naïve cases with a single intravitreal triamcinolone or bevacizumab injection. Chang Gung Med J. 2010; **33 (4):** 424–435.
9. **Cheng KC, Wu WC, Chen KJ.** Intravitreal triamcinolone acetonide vs bevacizumab for treatment of macular oedema secondary to branch retinal vein occlusion. Eye (Lond). 2009; **23 (11):** 2023–2033.
10. **Moon J, Kim M, Sagong M.** Combination therapy of intravitreal bevacizumab with single simultaneous posterior subtenon triamcinolone acetonide for macular edema due to branch retinal vein occlusion. Eye (Lond). 2016; **30 (8):** 1084–1090.
11. **Jonas JB, Akkoyun I, Kamppeter B, Kreissig I, Degenring RF.** Branch retinal vein occlusion treated by intravitreal triamcinolone acetonide. Eye (Lond). 2005; **19 (1):** 65–71.
12. **Haller JA, Bandello F, Belfort R, Blumenkranz MS, Gillies M, Heier J, et al.** Dexamethasone intravitreal implant in patients with macular edema related to branch or central retinal vein occlusion twelve-month study results. Ophthalmology, 2011; **118 (12):** 2453–2460.
13. **Kuppermann BD, Haller JA, Bandello F, Loewenstein A, Jiao J, Li XY,et al.** Onset and duration of visual acuity improvement after dexamethasone intravitreal implant in eyes with macular edema due to retinal vein occlusion. Retina, 2014; **34 (9):** 1743–1749.
14. **Javitt JC, Aiello LP, Chiang Y, Ferris FL, Canner JK, Greenfield S.** Preventive eye care in people with diabetes is cost-saving to the federal government. Implications for health-care reform. Diabetes Care, 1994; **17 (8):** 909–917.
15. **Hoerauf H, Feltgen N, Weiss C, Paulus E, Schmitz-Valckenberg S, Pielen A, et al.** Reply. Am J Ophthalmol. 2016; **169:** 292–3.
16. **Huynh E, Chandrasekera E, Bukowska D, McLenachan S, Mackey DA, Chen FK.** Past, Present, and Future Concepts of the Choroidal Scleral Interface Morphology on Optical Coherence Tomography. Asia Pac J Ophthalmol (Phila). 2017; **6 (1):** 94–103.
17. **Yiu G, Pecen P, Sarin N, Chiu SJ, Farsiu S, Mruthyunjaya P, et al.** Characterization of the choroid-scleral junction and suprachoroidal layer in healthy individuals on enhanced-depth imaging optical coherence tomography. JAMA Ophthalmology, 2014; **132 (2):** 174–181.
18. **Emi K, Pederson JE, Toris CB.** Hydrostatic pressure of the suprachoroidal space. Invest Ophthalmol Vis Sci. 1989; **30 (2):** 233–238.
19. **Jordan JF, Engels BF, Dinslage S, et al.** A novel approach to suprachoroidal drainage for the surgical treatment of intractable glaucoma. J Glaucoma, 2006; **15 (3):** 200–205.
20. **Einmahl S, Savoldelli M, D'Hermies F, Tabatabay C, Gurny R, Behar-Cohen F.** Evaluation of a novel biomaterial in the suprachoroidal space of the rabbit eye. Invest Ophthalmol Vis Sci. 2002; **43 (5):** 1533–1539.
21. **Willoughby AS, Vuong VS, Cunefare D, Farsiu S, Noronha G, Danis RP, et al.** Choroidal changes after suprachoroidal injection of triamcinolone acetonide in eyes with macular edema secondary to retinal vein occlusion. Am J Ophthalmol. 2018; **186:** 144-151.

Authors' Designation and Contribution

Irfan Muslim; Senior Registrar: *Concepts, Design, Literature search, final approval of the manuscript*

Nasir Chaudhry; Head of Department: *Data acquisition, Data analysis, Statistical analysis, final approval of the manuscript*

Rana Muhammad Mohsin Javed; Assistant Professor: *Data acquisition, Data analysis, Statistical analysis, final approval of the manuscript.*