

Comparative Study of Bevacizumab and Triamcinolone in Macular Edema Secondary to Branch Retinal Vein Occlusion

Shahnawaz Channa, Ameer Ahmed Memon and Farhan Khashim Al-Swailmi

ABSTRACT

Objective: The present study was conducted to compare the magnitude of efficacy and safety of Intra-Vitreous Bevacizumab (IVB) and intra-vitreous Triamcinolone (IVT) injection in Branch Retinal Vein Occlusion (BRVO).

Study Design: Comparative case series study

Place and Duration of Study: This study was conducted at the Department of Ophthalmology, El-Ibrahim Eye Hospital and Al-Tibri Medical College from January 2013 to March 2015.

Materials and Methods: A sample of 64 BRVO cases was selected by non-probability purposive sampling as per inclusion and exclusion criteria. The subjects were randomly grouped into; Group I. Bevacizumab (IVB) (n=32) and Group II. Triamcinolone (IVT) (n=32). Baseline vision (BCVA) was noted using ETDRS acuity chart. Central macular thickness (CMT) was computed using optical coherence tomography (OCT). Informed written consent was taken. The data was analyzed on Statistix 8.1 using student t-test and Chi square test. P-value of ≤ 0.05 was taken significant.

Results: Mean $\pm$ SD CMT in group I and II at baseline was $365.71 \pm 159.7\mu$ and $363.91 \pm 153.9\mu$ respectively ($p=0.95$). Similarly, difference was not observed in BCVA for near between 2 groups at first and second visit (week 4) ($p \geq 0.85$). At week 8 follow up, there was significant difference in the BCVA between groups (for distance $p = 0.03$ and for near ($p = 0.017$)). At week 8, mean CMT was reduced in IVB group compared to IVT ($p=0.045$). Mean $\pm$ SD duration of BRVO was 8.37 ± 4.21 and 8.35 ± 4.3 months ($p=0.09$) in IVB and IVT respectively. Subconjunctival hemorrhage, cataract and raised IOP were observed in IVT group.

Conclusion: Bevacizumab is more effective than triamcinolone in improving vision and reducing macular edema secondary to Branch Retinal Vein Occlusion. Triamcinolone showed more complications.

Key Words: Bevacizumab, Triamcinolone, Macular edema

Citation of article: Channa S, Memon AA, Al-Swailmi FK. Comparative Study of Bevacizumab and Triamcinolone in Macular Edema Secondary to Branch Retinal Vein Occlusion. Pakistan. Med Forum 2017;28(2):15-18.

INTRODUCTION

Branch retinal vein occlusion (BRVO) occurs in one of the tributary of retinal vein. Its incidence in outpatient departments approximates to central retinal vein occlusion.¹ Branch retinal vein occlusion (BRVO) is a vision disabling clinical condition. Its incidence after 4th decade onwards is reported as 2.14/year/1000 population.^{2,3} Previous studies have suggested BRVO predisposes to increased expression of a cytokine called vascular endothelium growth factor (VEGF). VEGF is involved in the pathogenesis of macular edema (ME).⁴

Department of Ophthalmology, College of Medicine,
Northern Border University Arar, Kingdom of Saudi Arabia

Correspondence: Dr. Shahnawaz Channa, Assistant Professor
of Ophthalmology, College of Medicine, Northern Border
University Arar, Kingdom of Saudi Arabia

Contact No: 00966530731004

Email: drchanna@yahoo.com

Received: November 5, 2016; Accepted: December 29, 2016

Currently there is no effective and unanimously accepted treatment option for BRVO-related ME.² One modality of treatment used for ME includes photocoagulation but achieved limited results. Another available treatment option is the triamcinolone which has shown variable success rates but at a cost of high complication rates.^{1,4}

Currently, a newer drug modality is widely used called the Bevacizumab. Bevacizumab is a recombinant humanized monoclonal antibody which blocks angiogenesis by inhibiting all isoforms of VEGF. VEGF stimulates the angiogenesis in a variety of diseases, including the ME.⁵ Bevacizumab inhibits and reduces not only the neovascularization but also macular edema.⁶ Bevacizumab reduces macular edema and improves vision in BRVO related ME.⁷ Triamcinolone is also effective but has a lot of reported complications.⁸

Although previous studies had demonstrated the advantages and disadvantages of one treatment modality over other, however, the results are disputed and inconclusive.^{9,10}

Therefore, the present study was designed to investigate efficacy and safety of intravitreal triamcinolone acetonide (IVT) and intravitreal bevacizumab (IVB) in the treatment of ME related to BRVO at our tertiary care hospital.

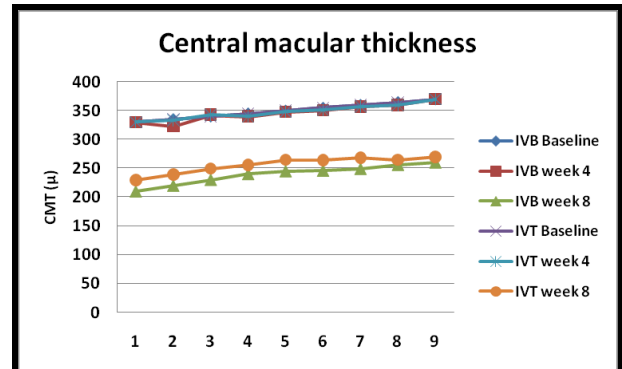
MATERIALS AND METHODS

The present comparative case series study was conducted at the Department of Ophthalmology, Department of Ophthalmology, El-Ibrahim Eye Hospital and Al-Tibri Medical College from January 2013 to March 2015. A sample of 64 patients of BRVO was selected and divided into two groups; Group I. Intravitreal Bevacizumab (IVB) (n=32) and Group II. Intravitreal triamcinolone (IVT) (n=32). Subjects were selected as per predefined inclusion and exclusion criteria. RBVO related ME cases were included by non-probability purposive sampling. Macula looking thicker than surrounding parts of retina was deemed as ME positive as examined by slit lamp biomicroscope and 90 diopter lens. Diagnosis of RBVO was made if multiple flame-shaped hemorrhages in any quadrant of fundus with dilated retinal vein were observed. Dilated retinal vein was defined as vein with caliber larger than rest of veins on funduscopy. The funduscopy was performed with slit lamp biomicroscope and 90 diopter lens. Patients with diabetic maculopathy, traction retinal detachment, macular pucker, vitreous hemorrhage, maculopathy of other etiologies and central retinal vein occlusion (CRVO) were excluded. Volunteers were asked to sign informed written consent. Baseline vision

(BCVA) was checked by ETDRS acuity chart. Optical coherence tomography (OCT) was used to computed central macular thickness (CMT). Improvement of vision and central macular thickness were noted at baseline, week 4 and week 8. The data was analyzed on statistix 8.1 (USA). Continuous and categorical variables were analyzed by Student's t test and Chi-square test respectively. Data was analyzed at 95% confidence interval with significant p-value of ≤ 0.5 .

RESULTS

Age mean $\pm$ SD was noted as 51.6 ± 7.01 and 52.1 ± 5.6 years in group I and II respectively ($p=0.93$).



Graph No.I. Graph shows the central macular thickness in Bevacizumab (IVB) and triamcinolone (IVT) at baseline, week 4 and 8.

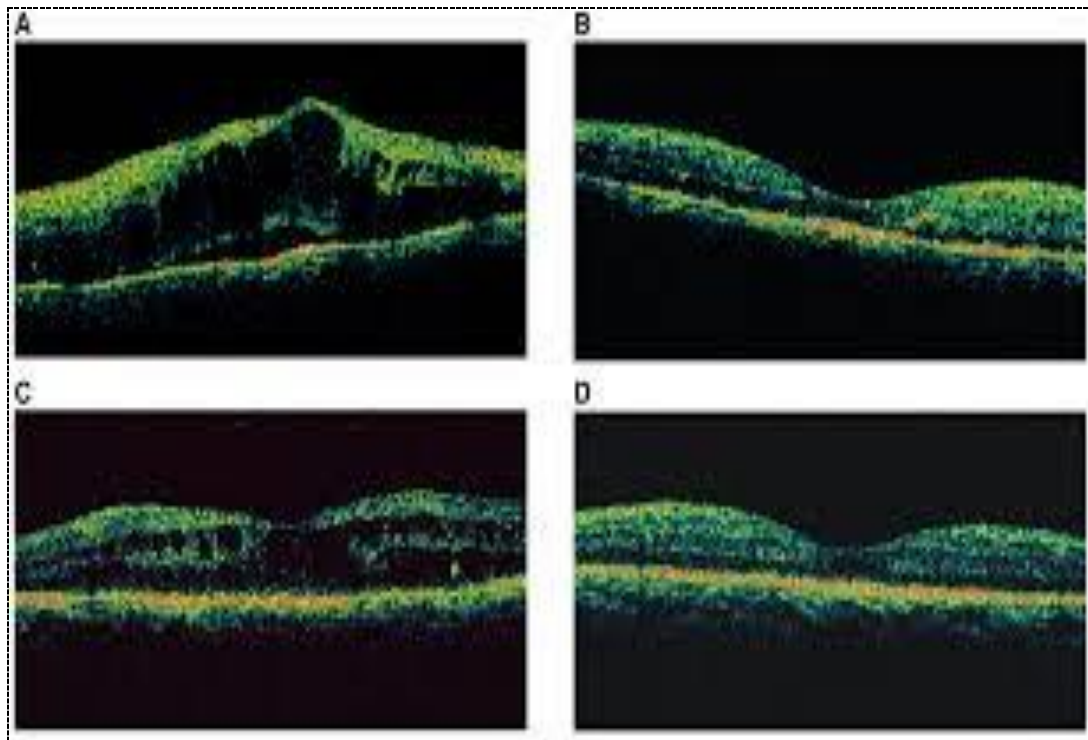


Figure I. A. Pre-injection baseline triamcinolone, B. Post-injection IVT at week 8, C. Pre-injection baseline Bevacizumab, D. Post-injection Bevacizumab at week 8

Group I comprised of 19 (59.3%) male and 13 (40.6%) female ($\chi^2=49.1$, $p=0.034$) and group II 16 (50%) male and 16 (50%) female ($\chi^2=1.01$, $p=0.90$). Mean $\pm$ SD duration of BRVO was 8.37 ± 4.21 and 8.35 ± 4.3 months ($p=0.09$) in IVB and IVT respectively. Mean $\pm$ SD of central macular thickness (CMT) in group I and II at baseline was $365.71\pm 159.7\mu$ and $363.91\pm 153.9\mu$ respectively ($p=0.95$).

Similarly, difference was not observed in BCVA for near at 1st visit and 2nd follow up visit at week 4 ($p\geq 0.85$) between 2 groups. At week 8 follow up, there was significant difference in the BCVA (for distance $p=0.03$ and for near $p=0.017$).

At week 8, mean CMT was reduced in IVB group compared to IVT, but difference was statistically non-significant ($p>0.05$) (graph I). IVB group showed visual improvement in 28 (87%) compared to 20 (62.5%) in IVT at week 8 ($p=0.017$). 3 in IVB and 11 in IVT showed no improvement in vision ($p=0.011$) on comparison of pre and post treatment vision. On the contrary, one patient in each group showed decrease in vision.

Procedure related complications; the subconjunctival hemorrhage, raised intraocular pressure (IOP) and cataract were noted in both groups but more in IVT group compared to IVB. One patient of endophthalmitis was noted in the IVT (group II). Triamcinolone group showed one patient of cataract and 8 (24.9%) of raised IOP. Topical agents were used to control raised IOP. Raised IOP was not observed in IVB group ($p=0.0001$).

DISCUSSION

Retinal vein occlusion is one of the major causes of blindness Worldwide. Still controversies exist in the management options to be preferred one over other.³ Although, most of the researchers believe that early detection of the disease can prevent vision loss if managed properly and appropriately thus reducing the morbidity.^{1,4} Controversies also exist regarding the exact causes of retinal vein occlusion, but thrombus formation has been considered as the most important cause of retinal vein occlusion.¹¹ Retinal vein occlusion has been the subject of almost incessant research but its etiology and mechanism remains ambiguity.¹²

Branch retinal vein occlusion (BRVO) is one of the frequent retinal vascular diseases.¹³ BRVO may reduce blood perfusion of retina with manifest retinal hypoxia resulting in vision loss. It can also be complicated by ME, which further intensifies the loss of vision. Some time the vision loss caused by macular edema exceeds the vision loss caused by hypoxia itself. Multiple treatment options have been tried as reported including "laser photocoagulation".^{14, 15}

It has been shown in many studies that VEGF is one of the factors that is released in increased amount after branch retinal vein occlusion and is associated with certain complication such as macular edema.¹⁶ The

exact mechanism behind this effect is that the retinal ischemia which causes up regulation of VEGF.

In many studies, IVT has been used in patients with macular edema secondary to BRVO. Variation has been reported in its success by many researchers.¹⁷

It is suggested that by inhibiting the VEGF, the vascular leakage could be prevented as a consequence a reduction occurs in macular edema also.¹⁶ A previous retrospective study by Fish et al, analyzed 56 patients treated with Bevacizumab alone or in combined with Triamcinolone. The Bevacizumab proved more effective than Triamcinolone acetate in improving the vision.¹⁷

Another previous study¹⁸ confirmed the effectiveness of Bevacizumab in improving the macular edema due to BRVO; it was reported that 2-3 injections might be needed in every patient due to short half life of the Bevacizumab injection.¹⁸ The findings of above study are consistent with our present study.

A previous study by Rabeena et al¹⁹ reported the effects of Bevacizumab in macular edema due to BRVO. He reported a successful result of Bevacizumab in improving vision and reducing the central macular thickness as well, with almost negligible adverse effects. The findings of present are consistent with above cited study. Two more previous studies reported similar effectiveness with safety of the drug.^{20, 21} Previous studies had reported adverse effects such as raised IOP and risk in intraocular infections by triamcinolone²², the findings are consistent with present study. The present study reports Bevacizumab more effective and safe in reducing macular edema in branch retinal vein occlusion. The present study has some limitations, in particular those of sample size, for which further studies may be conducted on large scale for results to be authenticated.

CONCLUSION

Bevacizumab is more effective than triamcinolone in improving vision and reducing macular edema secondary to Branch Retinal Vein Occlusion. Triamcinolone showed more complications. Further studies with large sample size are recommended to confirm the findings.

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Hayerh SS. Retinal vein occlusion. *Ind J Ophthalmol* 1994;42(3):109.
2. Gokce G, Sobaci G, Durukan AH, Erdurman FC. The comparison of intravitreal triamcinolone and bevacizumab in patients with macular edema secondary to branch retinal vein occlusion. *Clin Ophthalmol* 2014;8:355–62.

3. David R, Zangwill L, Badarna M, Yassur Y. Epidemiology of retinal vein occlusion and its association with glaucoma and increased intraocular pressure. *Int J Ophthalmol* 1988; 197(2):69.
4. Noma H, Funatsu H, Yamasaki M, Tsukamoto H, Mimura T, Jian K, et al. Pathogenesis of macular edema with branch retinal vein occlusion and intraocular levels of vascular endothelial growth factor and interleukin-6. *Am J Ophthalmol* 2005; 140(2):256.
5. Khasraw M, Ameratung, MS, Grant R, Wheeler H, Pavlakis N. Antiangiogenic therapy for high-grade glioma. The Cochrane database of systematic reviews 2014; 9:CD008218.
6. Mathias A, Christoph T, Ute W, Daniel B, Sbastian W, Johannes F. Treatment of Branch Retinal Vein Occlusion induced Macular Edema with Bevacizumab. *BMC Ophthalmol* 2008;8:18.
7. Cahill MT, Stinnett SS, Fekrat S. Meta-analysis of plasma homocysteine, serum folate, serum vitamin B₁₂, and thermolabile MTHFR genotype as risk factors for retinal vein occlusive disease. *Am J Ophthalmol* 2003;136:1136.
8. Ferrara N, Hillan KJ, Nowotny W. Bevacizumab (Avastin), a humanized anti-VEGF monoclonal antibody for cancer therapy. *Biochem Biophys Res Commun* 2005;3:333.
9. Cheng KC, Wu WC, Chen KJ. Intravitreal triamcinolone acetate vs bevacizumab for treatment of macular oedema secondary to branch retinal vein occlusion. *Eye (Lond)* 2009; 23(11): 2023–33.
10. Byun YJ, Roh MI, Lee SC, Koh HJ. Intravitreal triamcinolone acetate versus bevacizumab therapy for macular edema associated with branch retinal vein occlusion. *Graefes Arch Clin Exp Ophthalmol* 2010; 248(7):963–71.
11. Aisenbrey S, Ziemssen F, Volker M, Gelissen F, Szurman P, Jaissle G, et al. Intravitreal bevacizumab (Avastin) for occult choroidal neovascularization in age-related macular degeneration. *Graefes Arch Clin Exp Ophthalmol* 2006;245:941.
12. Yoganathan P, Deramo VA, Lai JC, Tibrewala RK, Fastenberg DM. Visual improvement following intravitreal bevacizumab (Avastin) in exudative age-related macular degeneration. *Retina* 2006; 26:994.
13. Leibreich R. Apoplexia Retinae. *Graefes Arch Ophthalmol* 1855; 1:346.
14. David R, Zangwill L, Badarna M, Yassur, Y. Epidemiology of retinal vein occlusion and its association with glaucoma and increased intraocular pressure. *Ophthalmologica Journal international d'ophtalmologie. Int J Ophthalmol* 1988;197(2):69.
15. Yag Y. Argon laser photocoagulation for macular edema in branch vein occlusion. The Branch Vein Occlusion Study Group. *Am J Ophthalmol* 1984; 98(3):271.
16. Cekic O, Chang S, Tseng JJ, Barille GF, 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.
17. Noma H, Funatsu H, Yamasaki M, Tsukamoto H, Mimura T, Sone T, et al. Pathogenesis of macular edema with branch retinal vein occlusion and intraocular levels of vascular endothelial growth factor and interleukin-6. *Am J Ophthalmol* 2005; 140(2):256.
18. Abegg M, Tappeiner C, Wolf-Schnurrbusch U, Barthelmes D, Wolf S, Fleischhauer J. Treatment of Branch Retinal Vein Occlusion induced Macular Edema with Bevacizumab. *BMC Ophthalmol* 2008; 8:18.
19. Rabena MD, Pieramici DJ, Castellarin AA, Nasir MA, Avery RL. Intravitreal Bevacizumab (Avastin) in the Treatment of Macular Edema Secondary to Branch Retinal Vein Occlusion. *Retina* 2007; 27 (4):419.
20. Wu L, Arevalo J, Roca J, Maia M, Berrocal M, Rodriguez FJ, et al. Comparison Of Two Doses Of Intravitreal Bevacizumab (Avastin) For Treatment Of Macular Edema Secondary To Branch Retinal Vein Occlusion: Results From the Pan-American Collaborative Retina Study Group at 6 Months of Follow-Up. *Retina* 2008; 28 (2):212.
21. Eun JC, Young TH, Sung CL, Oh WK, Hyoung JK. Prognostic factors for visual outcome after intravitreal bevacizumab for macular edema due to branch retinal vein occlusion. *Graefes Arch Clin Exper Ophthalmol* 2008; 246(9):1241.
22. Jing H, Yong T, Yan-Rong J, Xiao-Xin L, Lei G. Intravitreal bevacizumab versus triamcinolone acetate for macular edema due to branch retinal vein occlusion: a matched study. *Chinese Med J* 2009;122(22):1-6.