

# Combined Phacoemulsification and Intravitreal Bevacizumab Injection in the Treatment of Patients with Branch Retinal Vein Occlusion (BRVO) and Cataract - Case Series



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## Abstract

Branch retinal vein occlusion (BRVO) can sometimes be found by accident during preoperative cataract surgery examination. Purpose of this study is to show the results of combined procedures of cataract phacoemulsification and intravitreal anti-VEGF (Bevacizumab) application in patients with branch retinal vein occlusion and consecutive macular edema.

**Material and methods:** 7 patients (7 eyes) were planned for cataract surgery. Mean age was  $52 \pm 9$  years, 5 female and 2 male, visual acuity (VA) ranges between 0.1 to 0.3 (Snellen chart), and nuclear hardness from N+1–N+3. During first examination branch retinal vein occlusion was observed and SD-OCT, and fluorescein angiography were conducted to confirm. Since the changes on fundus could not be examine in details due to cataract formation, cataract surgery was scheduled. All patients received 0,05ml (1,25mg) intravitreal anti-VEGF (Bevacizumab) in the same session with cataract surgery. In all patients uncomplicated coaxial 2.75mm phacoemulsification technique was performed with temporal approach. Follow up visits were at the first and 7th day and one month after surgery and every 4-6 weeks after. All patients received topical tobramycin-dexamethasone eye drops 6 times daily for 4 weeks after surgery. Follow up period was 12 months.

**Results:** In all patients successful cataract removal was achieved. No posterior capsule rupture was observed. Mean VA before the surgery was  $0.18 \pm 0.1$  and average macular thickness  $519 \pm 42 \mu\text{m}$ . One month after the surgery mean VA was  $0.61 \pm 0.18$  and average macular thickness was  $229 \pm 37 \mu\text{m}$  and remains stable during follow-up period. Conclusion: according to our study combining intra vitreal application of anti-VEGF therapy and cataract surgery in patients with BRVO and macular edema have beneficial effect on visual acuity and macular stability during follow-up period. No adverse effects were observed. Larger studies and long-term follow-up is required to evaluate the safety and treatment durability.

**Keywords:** Vein occlusion; Branch retinal vein occlusion; BRVO; Phacoemulsification; Bevacizumab; Anti-VEGF; Macular edema

**Abbreviations:** ME: Macular Edema; BRVO: Branch Retinal Vein Occlusion; FA: Fluorescein Angiography; VEGF: Vascular Endothelial Growth Factor; IOP: Intraocular Pressure; SD-OCT: Spectral Domain Optical Coherence Tomography; VA: Visual Acuity

## Introduction

Branch retinal vein occlusion (BRVO) is the second most common vascular disease of retina. It accounts for 80% of all retinal vein occlusion affecting around 16 million of people worldwide with prevalence about 4 per 1,000 of individuals [1,2]. BRVO refers to an occlusion of retinal vein draining into retinal quadrant, portion of macula or retinal periphery. It usually occurs at the site where arteries and veins share common adventitia as a result of vein compression, vasoconstriction or inflammation and coagulation disturbances. Secondary macular edema (ME) is the main cause of visual lose and it can be seen in around 60% of patients with BRVO [3,4]. Symptoms of BRVO represents sudden usually unilateral painless loss of vision,

transient visual disturbances and scotomas. Diagnosis of BRVO is established based on symptoms, clinical findings, optical coherence tomography (OCT) and fluorescein angiography (FA). In the presence of cataract, intensity of the symptoms can be weekend and it is difficult to obtain quality images during the follow up period. Several treatments modalities for macular edema secondary to BRVO have been emerged and evaluated in randomized clinical trials. This included laser photocoagulation, intravitreal triamcinolone injections, intravitreal dexamethasone implants, and inhibitors of vascular endothelial growth factor (VEGF) agents [5-10]. The aim of this retrospective study was to evaluate the effect of phacoemulsification and intravitreal bevacizumab injection in patients with BRVO and cataract.

## Materials and Methods

This retrospective case series enrolled 7 patients (7 eyes) with secondary macular edema due to BRVO and cataract interfering the macular laser photocoagulation who have undergone phacoemulsification with intra vitreal injection of 0.05ml (1.25mg) bevacizumab. Preoperative examination included best corrected visual acuity - BCVA (Snellen charts), intra ocular pressure (IOP), detail bio-microscopy (full mydriasis), A-scan biometry and slit-lamp ophthalmoscopy. Spectral domain optical coherence tomography (SD-OCT) with CMT records was preoperatively performed in all patients. Under topical anesthesia 2.75mm clear corneal incision was performed via temporal approach. Anterior chamber was filled with viscoelastic substance and curve line capsulorhexis was performed using 28 gauge cystotome and forceps. After hydro-dissection, phacoemulsification using quick-chop technique and removal of residual cortex was performed.

Capsular bag was inflated with sodium hyaluronate and single piece hydrophobic acrylic lens was implanted. After lens implantation anti-VEGF injection of bevacizumab was performed through pars plana 3.5-4mm posterior from the limbus with 30 gauge needle. Residual viscoelastic substance was washed out and wounds were hydrated. All patients received dexamethasone/gentamycin (4mg/10mg) sub conjunctival injection after the procedure. Follow up visits were at the first and 7th day after the surgery, one month after and every 4-6 weeks after. All patients received topical tobramycin-dexamethasone eye drops 4 times daily for 3 weeks after surgery in combination with NSAID 4 times daily for one month. Follow up period was 12 months. Complete ophthalmologic examinations were performed on each follow up visits and included BCVA, slit lamp bio-microscopy under maximal mydriasis and SD OCT examination. During follow up period in two eyes photocoagulation was performed based on fluorescein angiography (FA) for the treatment of peripheral non perfusion. Additional anti-VEGF injections were administered based on OCT findings in 2 eyes.

## Results

Seven patients (7 eyes) with secondary macular edema due to BRVO and cataract had undergone cataract surgery and intravitreal injection of 1.25mg bevacizumab. Five patients were female and two of them were male. The mean age was 52±9 (SD). The initial BCVA (Decimal equivalents of Snellen chart) ranges from 0.1 to 0.3. Mean BCVA before the surgery was 0.18±0.1 (SD). One month after the surgery BCVA was 0.45±0.12 (SD) Best corrected visual acuity after six and twelve months was 0.56±0.14 (SD) and 0.61±0.18 (SD) consecutively. Central macular thickness (CMT) before surgery was 519±42µm. One month after the surgery CMT was 319±72µm, six and twelve months 238±42µm and 229±37µm consecutively. Intraocular complications related to cataract surgery such as posterior capsule rupture, vitreous loss or postoperative complication related to intra vitreal injection were not observed.

## Discussion

Retinal vein occlusion has been defined as retinal vascular disease characterized by intra retinal hemorrhage, intra retinal edema, engorgement and dilatation of retinal veins, cotton wool spots, retinal exudates and macular edema which is the main cause of visual loss. The majority of cases present branch retinal vein occlusion BRVO. BRVO usually occurs at the site where artery and vein share common adventitia. At this point artery usually lies anterior to the vein and makes it susceptible to compression which in turn leads to turbulent flow, endothelial damage and thrombus formation. This process is exacerbated with arteriosclerosis. Visual disturbances occur as a result of macular edema (ME) secondary to BRVO. Few data are available for the incidence of ME and varies from 5-15% [11]. Current treatment options for BRVO include laser photocoagulation for focal ME secondary to BRVO and peripheral ischemia and anti-VEGF and corticosteroids for centrally involved ME.

If the cataract density permits the laser photocoagulation of macular region and possibility to obtain quality imaging examinations, treatment of macular edema due to BRVO can precede cataract surgery which can be postponed until ME subsides. It is well known that cataract surgery can cause ME even in patients without any retinal vascular disease or cause exacerbation of macular edema [12-14]. In patients with ME and significant cataract which alter the view of the fundus, other treatment alternatives such as intra vitreal injection of pharmacological agents have been used before, during or after the cataract surgery. Studies have been investigated the effect of application of different pharmacological agents in the form of intra vitreal injections during cataract procedure in patients with macular edema secondary to vascular diseases and lens opacities. Akinci et al. [15], evaluated the safety and efficiency of combined phacoemulsification and intravitreal application of anti-VEGF bevacizumab alone or in combination with triamcinolone in patients with diabetic macular edema in whom laser photocoagulation could not be performed because of significant lens opacities. Both studies showed that the usage of intra vitreal pharmacological agents did not only prevent exacerbation of macular edema, but also significantly reduced preexisting macular edema [15,16]. Lanzagorta et al. [17], found that usage of anti-angiogenic drugs associated with cataract surgery may improve surgical outcomes and diminish foveal thickness in patients with DME [17]. Similar results were confirmed by Agrawal et al. [18], with intra vitreal application of Ozurdex™ intra vitreal implant at the same time of cataract surgery. Significant reduction of central macular thickness and improved in visual acuity was achieved and last up to 3-4 months [18].

## Conclusion

Our study evaluates the results of combined phacoemulsification and 1.25mg of bevacizumab intravitreal application in patients with ME secondary to BRVO. Most of the

studies which can be found in the literature evaluated combined approach in patients with secondary macular edema due to diabetic retinopathy. Since the therapeutic strategies for both diabetic macular edema and secondary macular edema due to BRVO are similar our study was guided based on those findings. According to our results, combined therapeutic approach did not cause exacerbation of macular edema in patients with BRVO but also led to significant reduction of ME. Further prospective studies with large number of patients and longer follow up period are needed to evaluate the outcomes of this combined procedure.

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