ORIGINAL ARTICLE

Visual Outcomes of Pars Plana Vitrectomy Alone or with Intravitreal Bevacizumab in Patients of Diabetic Vitreous Haemorrhage

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Abstract

Objective: To evaluate the visual outcomes of pars plana vitrectomy (PPV) alone or with intravitreal bevacizumab in patients of diabetic vitreous haemorrhage.

Study Design: A quasi-experimental study.

Place and Duration of Study: Al-Ibrahim Eye Hospital, Malir, Karachi, from March to November 2018.

Methodology: Patients between 40-70 years of age, irrespective of gender with non-resolving dense diabetic vitreous haemorrhage were divided into two groups. Group A received injection bevacizumab 7 days before PPV surgery. Group B received no preoperative injection. Log Mar chart was used for documenting postoperative vision. All patients completed their 6 months follow-up. SPSS was used to analyse the data.

Results: Best corrected visual acuity (BCVA) was documented as improved, same, or worse. In Group A, 21 (70%) patients had improved VA; whereas, in Group B, 17 (56.6%) patients showed improved visual acuity postoperatively. Patients were examined at four weeks, three months, and six months, respectively for recurrent vitreous haemorrhage. In Group A, 25 (83.3%) patients had no vitreous haemorrhage up to six months, whereas, in Group B, 13 (43.3%) patients had no vitreous haemorrhage up to six months with p-value of 0.021.

Conclusion: Anti VEGF injection bevacizumab before PPV in patients with non-resolving diabetic vitreous haemorrhage is good to get better results in terms of BCVA, as well as reduce the incidence of recurrent vitreous haemorrhage.

Key Words: *Pars plana vitrectomy, Diabetic vitreous haemorrhage, Bevacizumab.*

INTRODUCTION

Diabetes mellitus is a non-communicable metabolic syndrome worldwide.[1] One of the most important cause of blindness is diabetic retinopathy in the population aged between 20-74 years.[2] The incidence of diabetic retinopathy increases as time duration of diabetes increases and nearly all patients with Type 1 and more than 60% with Type 2 patients with diabetes develop some signs of retinopathy after 20 years duration.[3] Dense vitreous haemorrhage and tractional retinal detachment are the sequel of advance diabetic eye disease (ADED).[4] Vascular changes in diabetes lead to ischemia of retina and, in turn, release of vascular endothelial growth factor (VEGF).[5] Anti-VEGF bevacizumab injection (avastin) is best therapy used for ADED and neovascular age-related macular degeneration (ARMD).[6] Bevacizumab is anti-VEGF and acts against all isoforms of VEGF.[7] Pars plana vitrectomy (PPV) is recommended worldwide for managing and controlling complications of proliferative diabetic retinopathy (PDR) like tractional retinal detachment (TRD) and non-resolving vitreous haemorrhage (VH).[7] The use of anti-VEGF agents in patients undergoing PPV secondary to diabetic VH results in low complication rate, improvement in post-operative best corrected visual acuity (BCVA),[8] and reduce the rate of recurrent VH.[9]

Two complications of ADED that are good indication of vitrectomy are VH and TRD.[10] VH is the leaking of blood into the vitreous cavity.[11] Vitreous gel is avascular. VH happens once blood leaks from damaged vessels into the vitreous cavity. It is painless and sudden in onset. VH sometimes happens in adult patients with proliferative diabetic retinopathy, retinal break, retinal vascular diseases, posterior vitreous detachment, or ocular trauma.[12] Moreover retinal artery macro aneurysms, choroidal neovascularisation, and intraocular tumors can also cause VH.[13] Patients with VH that obscures fundus view, is mostly caused by a retinal tear or retinal vasculopathy faces a classic clinical dilemma.[14] Bevacizumab can cause regression of retinal neovascularisation in diabetic patients.[15] Therefore, it was suggested that a pre-operative administration of intravitreal bevacizumab (IVB) may reduce bleeding during vitrectomy surgery in proliferative diabetic retinopathy.[16] However, the preoperative IVB injection remains controversial. Some studies reported that preoperative bevacizumab injection for diabetic vitrectomy did not affect the rate of postoperative vitreous haemorrhage or final visual acuity.[17] Although many surgeons give IVB before vitrectomy in diabetic patients,[18] the use of IVB 7

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days before vitrectomy may reduce bleeding intra-operatively. Reduction in bleeding is less (64%) in patients who receive anti-VEGF before vitrectomy then those who do not receive injection before surgery.

The rationale of this study was to determine the role of preoperative anti-VEGF injection bevacizumab in patients of dense VH undergoing PPV. The objective of the present study was to know the visual outcomes of PPV in patients of diabetic VH alone or with anti-VEGF bevacizumab.

METHODOLOGY

This was a quasi-experimental study with non-probability purposive sampling carried out at Al-Ibrahim Eye Hospital, Karachi from March to November 2018. Ethical approval was taken from the Research Ethical Committee of Isra Postgraduate Institute of Ophthalmology. Patients of age group between 40-70 years, irrespective of gender diagnosed with diabetic VH, were included in this study. Patients with history of any ocular surgery or complications, un-controlled diabetes and patients who did not give consent, were excluded from study. Sample size was drawn from the software G power version 3.0.9.2 by taking the statistical conditions of 95% confidence interval, 5% margin of error. The sample size was estimated to be 60. Two groups were made in this study. Group A received Intravitreal injection of 1.25 mg in 0.05 ml bevacizumab about 3.5 mm from limbus seven days before PPV. After seven days, these patients underwent 23 gauge 3-ports PPV. Patients of Group B underwent 23 gauge PPV without getting preoperative injection bevacizumab. All the surgeries were performed by one retina specialist. Every patient was facilitated with ophthalmic examination including refraction and visual acuity by Log Mar chart and slit lamp bio-microscopy 90 D fundus lens. Fundus images were taken by fundus camera. Intra-ocular pressure (IOP) was measured by non-contact tonometer. B-scan ultrasonography was done pre-operatively to see the status of retina in cases of dense VH.

SPSS version 23.0 was used to analyse the data. Continuous variables were presented in mean SD. Categorical variables were presented in frequency and percentages. To see the significance between different variables, Chi-square test or Fisher exact test was applied. P-value $\leq$0.05 was considered to be statistically significant.

RESULTS

A total of 60 patients were included in this study. These were divided into two groups. Group A received injection bevacizumab 7 days before surgery. Group B received no preoperative injection. Out of 60 patients, 17 (56.6%) males and 13 (43.3%) females were included in Group A; whereas, 11 (36.6%) males and 19 (63.6%) females were included in Group B. Most of the patients 11 (36.6%) in Group A were falling in age group of 56-65 years; whereas, in Group B, 10 (33.3%) patients were in 46-55 years of age group and 8 (26.6%) patients were in 56-65 years of age group, respectively.

Postoperatively, BCVA were measured by Log Mar chart. In Group A, 13 (43.3%) patients were having visual acuity of 1.00-0.70, while 14 patients (46.6%) in Group B had visual acuity of >1.0 with significant p-value of 0.001 (Table I).

At 4 weeks, 3 months and 6 months, patients were examined for recurrent VH. In Group A, 25 (83.3%) patients had no VH up to 6 months; whereas, in Group B, 13 (43.3%) patients had no VH up to 6 months with a significant p-value of 0.021 (Table II).

Postoperatively, BCVA was seen in terms of improved, same, or worse visual acuity. In Group A, 21 (70%) patients had improved VA; whereas, in Group B, 17 (56.6%) patients had improved their vision after surgery.

Table I: Comparison of BCVA in both groups.

BCVA (Log Mar)	Group A (with preoperative injection Bevacizumab)	Group B (without preoperative injection Bevacizumab)	Total	p-value
>1.0	7 (23.3%)	14 (46.6%)	21(35.0%)	0.001
1.0-0.70	13 (43.3%)	9 (30.0%)	22 (36.6%)	
0.6-0.4	7 (23.3%)	5 (16.6%)	12 (20.0%)	
<0.40-0.0	3 (10.0%)	2 (6.6%)	5 (8.3%)	
Total	30	30	60	

Table II: Frequency of recurrent vitreous haemorrhage.

Frequency of recurrent Vit Hg	Group A (with preoperative injection Bevacizumab)	Group B (without preoperative injection Bevacizumab)	Total	p-value
Early Vit Hg (within 4 weeks)	2 (6.6%)	10 (33.3%)	12 (20.0%)	0.021
Late Vit Hg (3 months)	3 (10.0%)	7 (23.3%)	10 (16.6%)	
No Vit Hg (6 months)	25 (83.3%)	13 (43.3%)	38 (63.3%)	
Total	30	30	60	

DISCUSSION

The primary purpose of this study was to evaluate the visual outcomes of PPV alone or with intravitreal bevacizumab in patients with diabetic VH. In Third World countries, diabetic patients present in late stages of disease, due to lack of awareness about the disease and its complications, poor socioeconomic condition of patients leading to poor compliance with medications and healthcare professionals, thus results in developing severe form of diabetic retinopathy like ADED. Preoperative use of bevacizumab injection in ADED results in regression of neovascularisation; thus helping to get better outcomes of vitrectomy surgery.

In this study, researcher divided samples in two groups. Group A received intravitreal injection of 1.25 mg 0.05 ml bevacizumab about 3.5 mm from limbus seven days before PPV. These patients underwent 23 gauge 3 ports PPV after seven days of injection. Patients in Group B, underwent 23 gauge PPV without receiving preoperative injection bevacizumab. In present study, group A had 17 (56.6%) male and group B had 11 (36.6%) male patients which were less in number as compared to Group A. Patients within age group 56-65 years was more, 11 (36.6%) in group A; whereas, in group B, there were 8 (33.3%) patients in the same age group. BCVA were measured by Log Mar chart. Most patients, 13 (43.3%) of Group A, had visual acuity of 1.00-0.70 and 14 (46.6%) patients of Group B had visual acuity of >1.0 with significant p-value of 0.001, postoperatively.

In present study, patients were examined for recurrent VH at 4 weeks, 3 months and 6 months, respectively. In Group A, 25 (83.3%) patients had no vitreous haemorrhage up to 6 months; whereas, in Group B, 13 (43.3%) patients had no VH up to 6 months with a significant p-value of 0.021. Similar results have been reported by Cooper *et al*. that final visual acuity after the last vitrectomy was 20/50 or better in 25%, between 20/60 and 20/400 in 47%, and worse than 20/400 in 28%.[19]

In the current study, BCVA was seen in terms of improved, same or worse visual acuity. In Group A, 21 (70%) patients had improved VA postoperatively; whereas, in Group B, 17 (56.6%) patients had improved visual acuity after surgery. Iqbal *et al*. reported that improvement of visual acuity was in 82% patients, stable in 10%, and 8% was found to be worse.[20] Both Brynskov and Kiss *et al*. studies stated that for the improvement of vision, vitrectomy is used to remove opaque VH.[21,22] It also minimises the spread of VEGF, which is a major culprit in neovascularisation.

In this study, intraoperative reduction in bleeding was observed in both groups. Group A (preoperative avastin before PPV) no bleeding was seen in 70.5%, mild bleeding in 15.2%, and in only 14.3% of patients had severe bleeding which needed diathermy to stop the bleeding. However, in Group B (without preoperative avastin), no bleeding was observed in only 15.2% and severe in 84.8%. A study done by Rizzo *et al*. reported same findings that preoperative avastin group with no bleeding was observed in 54% patients, mild in 27%, and severe in 18%; and another group with no preoperative avastin, there was no bleeding in 18%, only and severe in 81.8%.[23] Literature supports that Anti-VEGF Bevacizumab is associated with less surgical complications and more surgical outcomes, thus its use is recommended worldwide as a necessary adjunct therapy before diabetic PPV.[24,25]

CONCLUSION

Anti-VEGF injection bevacizumab before PPV surgery is good to get better results in terms of BCVA post-operatively in patients with non-resolving dense diabetic VH, as well as reduce the incidence of recurrent VH.

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