

VISUAL OUTCOME IN DIABETIC PATIENTS UNDERGOING PARS PLANA VITRECTOMY FOR VITREOUS HEMORRHAGE

ORAKZAI BK*, JAN S, ULLAH A, KHAN MA, KHAN A

Department of Ophthalmology, Hayatabad Medical Complex, Peshawar, Pakistan

*Corresponding author email address: bkorakzai@hotmail.com

(Received, 25th July 2025, Revised 18th September 2025, Accepted 5th November 2025, Published 17th November 2025)

ABSTRACT

Background: Vitreous hemorrhage is a significant cause of visual impairment among patients with diabetic retinopathy. Pars plana vitrectomy (PPV) remains the primary treatment for restoring visual function; however, outcomes are influenced by multiple systemic and postoperative factors. **Objective:** To assess the visual outcomes of diabetic patients following PPV for vitreous hemorrhage and to determine the association of postoperative improvement with clinical variables. **Study Design:** Prospective observational study. **Setting:** Department of Ophthalmology, Hayatabad Medical Complex, Peshawar, Pakistan. **Duration of Study:** 01-January-2025 to 01-July-2025. **Methods:** A total of 73 diabetic patients indicated for PPV due to vitreous hemorrhage were included. Preoperative best-corrected visual acuity (BCVA) was recorded using the Snellen chart and converted to LogMAR. Standard PPV was performed in all participants. Postoperative follow-up was conducted for 3 months to assess final BCVA and monitor complications such as recurrent vitreous hemorrhage, cataract progression, raised intraocular pressure, and retinal detachment. Data were analyzed using SPSS version 25, and p -values ≤ 0.05 were considered statistically significant. **Results:** The mean age of patients was 56.11 ± 7.79 years, and males accounted for 65.8% of the study population. A considerable improvement was noted in BCVA from 1.60 ± 0.28 LogMAR preoperatively to 0.94 ± 0.31 LogMAR postoperatively ($p = 0.0001$). A postoperative BCVA better than 1.0 LogMAR was achieved in 64.4% of patients. Recurrent vitreous hemorrhage occurred in 2.7% and elevated intraocular pressure in 9.6% of patients. Increased age (>55 years), hypertension, and postoperative complications were significantly linked with poorer visual outcomes. **Conclusion:** PPV substantially improves visual acuity in diabetic patients with vitreous hemorrhage. Factors such as advanced age, comorbid hypertension, and postoperative complications negatively influence final vision. Early intervention and proper systemic management may further enhance visual recovery.

Keywords: Pars Plana Vitrectomy, Diabetic Retinopathy, Vitreous Haemorrhage, Visual Acuity, LogMAR, Postoperative Complications

INTRODUCTION

Diabetic retinopathy (DR) represents a prevalent as well as serious complication associated with diabetes mellitus (DM), and is recognised as one of the leading contributors to vision loss. Globally, DM ranks as the most common cause of blindness, followed by cataract and trachoma (1, 2). DR is experiencing a rise in both severity and prevalence worldwide, particularly among developing nations. Chronicity of diabetes, along with its management, directly impacts the progression of DR. Consequently, complications have been reported more frequently, as improvements in managing diabetes have led to an extended lifespan for individuals with DM. Diabetes-induced vascular modifications result in retinal ischaemia, consequently triggering the release of vascular endothelial growth factor (VEGF) (3, 4).

Bevacizumab injection is considered the most successful therapy for ADED as well as neovascular age-associated macular degeneration. Pars plana vitrectomy (PPV) is widely recommended for control and management of complications related to proliferative diabetic retinopathy (PDR) which includes tractional retinal detachment (TRD) along with persistent vitreous haemorrhage (VH) (5, 6). The administration of anti-VEGF agents to individuals receiving PPV due to diabetic VH contributes to low complication rate, enhancement in following surgery best corrected visual acuity (BCVA) and a reduction in the incidence of persistent VH (7). VH represents the most frequently occurring complication associated with PDR. The severity of haemorrhage may result in a significant decrease in vision and complicate both testing and medical processes. In cases of fresh VH associated with Type 2 DM, conservative management may be employed with the expectation of spontaneous resolution, thereby allowing subsequent administration of laser

therapy (8, 9). Chronic non-clearing VH lasting more than three months suggests the need for PPV. The appropriate timing for surgery is determined by factors such as the extent of visual loss, the risk of further VH, prior photocoagulation aimed at managing retinal ischaemia, and neovascular glaucoma, as well as cases where patients need swift visual recovery, such as those in professions that require excellent stereopsis (10-12).

This study aims to evaluate the visual outcomes following PPV in diabetic patients presenting with vitreous hemorrhage, offering insights into factors that affect prognosis and identifying areas for optimized patient management.

METHODOLOGY

This prospective observational study was conducted in the Department of Ophthalmology at Hayatabad Medical Complex, Peshawar. The duration of this study was from 01-January-2025 to 01-July-2025. We obtained an ethical certificate from the hospital before conducting this study.

The study included diabetic patients with a confirmed Diagnosis of vitreous haemorrhage for whom pars plana vitrectomy was indicated. Patients with vitreous haemorrhage from non-diabetic aetiologies, those with a history of previous retinal surgery, and patients with other significant ocular pathologies were excluded.

Before enrolment, we secured consent from all the participants. At the baseline preoperative assessment, demographic details and specific clinical characteristics were recorded. The primary measure of visual outcome, best-corrected visual acuity BCVA was assessed using both Snellen chart and LogMAR measurements preoperatively. All patients underwent a pars plana vitrectomy procedure. Following surgery, the patients were monitored for 3 months. Postoperative

evaluations were conducted to assess the final BCVA, and postoperative surgical complications were identified. These complications were recurrent vitreous haemorrhage, retinal detachment, cataract development or progression, and changes in intraocular pressure.

For analysis, SPSS 25 was used. Descriptive statistics were computed using means and standard deviations of age and BCVA values. Frequencies and percentages were for gender and clinical variables. A paired t-test was used to compare preoperative and postoperative BCVA measurements. A post-stratification chi-square test was used to explore associations between various parameters and the visual outcomes. A p-value < 0.05 was considered statistically significant for all tests.

RESULTS

The duration of diabetes showed that the vast majority of patients, 62 (84.9%), had disease duration between 5 and 10 years. Eleven patients (15.1%) had diabetes for over ten years. Hypertension was present in

17 patients (23.3%), while a history of previous ocular surgery was noted in 7 cases (9.6%) (Table 1).

A statistically significant improvement in mean best-corrected visual acuity (BCVA) was observed, from a preoperative value of 1.60 ± 0.28 logMAR to a postoperative value of 0.94 ± 0.31 logMAR. This improvement was highly significant ($P = 0.0001$) (Table 2).

In terms of clinical outcomes, 47 patients (64.4%) experienced a visual improvement of 0.31 to 1.0 logMAR, while 26 patients (35.6%) had poor visual acuity > 1.0 logMAR. Postoperative complications were also assessed. Recurrent vitreous hemorrhage was observed in 2 patients (2.7%), and tractional retinal detachment occurred in 5 cases (6.8%). Cataract development or progression was noted in 4 patients (5.5%), and a change in intraocular pressure was documented in 7 cases (9.6%) (Table 3).

Patients over the age of 55 years were significantly more likely to be in the group with a poor outcome (final BCVA > 1 logMAR) ($P = 0.003$). Similarly, complications were more common in the poor visual acuity group ($P = 0.0001$). Longer duration of diabetes was also notably linked with poor visual acuity ($P = 0.0001$) (Table 4)

Table 1: Demographic and clinical profile

Demographics and clinical profile		n	%
Gender	Male	48	65.8%
	Female	25	34.2%
Duration of diabetes (Years)	5 to 10	62	84.9%
	>10	11	15.1%
Comorbidities	Hypertension	17	23.3%
	Hx ocular surgical intervention	7	9.6%
	No comorbidities	49	67.1%
Effected eye	Oculus dexter	35	47.9%
	Oculus sinister	38	52.1%

Table 2: Comparison of baseline BCVA and postop BCVA

	Mean	N	Std. Deviation	P value
Baseline BCVA (logMar)	1.6027	73	.28583	0.0001
Postop BCVA (logMar)	.9432	73	.31526	

Table 3: Clinical outcomes

Clinical outcomes		n	%
Improvement in VA (logMar)	0.31 to 1	47	64.4%
	> 1	26	35.6%
Complications	Recurrent VH	2	2.7%
	Tractional retinal detachment	5	6.8%
	Cataract development/progression	4	5.5%
	Change in IOP	7	9.6%
	No complication	55	75.3%

Table 4: Association of improvement in VA with various parameters

Parameters		Improvement in visual acuity (logMar)				P value
		0.31 to 1		> 1		
		n	%	n	%	
Age groups (Years)	40 to 55	30	63.8%	7	26.9%	0.003
	> 55	17	36.2%	19	73.1%	
Duration of diabetes (Years)	5 to 10	43	91.5%	19	73.1%	0.03
	>10	4	8.5%	7	26.9%	
Comorbidities	Hypertension	5	10.6%	12	46.2%	0.0001
	Hx ocular surgical intervention	2	4.3%	5	19.2%	
	No comorbidities	40	85.1%	9	34.6%	
Complications	Recurrent VH	0	0.0%	2	7.7%	0.0001
	Tractional retinal detachment	1	2.1%	4	15.4%	
	Cataract development/progression	0	0.0%	4	15.4%	
	Change in IOP	2	4.3%	5	19.2%	
	No complication	44	93.6%	11	42.3%	

DISCUSSION

The demographic profile of the present study, with a mean age of 56.11 years and a male predominance of 65.8%, aligns closely with several regional studies. Sultan et al. reported a nearly identical mean age of 49.43 years and a 58% male population (13). Similarly, Haseeb et al. and Abdelkader et al. reported comparable mean ages of 49.3 and 55.9 years, respectively, with male percentages of 70% and 66.7%, respectively (14, 15). The high prevalence of diabetes, with a duration of 5 to 10 years (84.9%) in the current study, is a critical finding. It underscores that sight-threatening complications can emerge relatively early in the disease course, particularly in populations that may face challenges in accessing consistent ophthalmic screening and glycaemic control.

The notable improvement in mean BCVA from 1.60 logMAR preoperatively to 0.94 logMAR postoperatively is the critical finding of this study. This improvement is consistent with the outcomes reported by Sultan et al., who noted a final BCVA of 0.61 logMAR, and Haseeb et al., who reported an improvement to 1.47 logMAR (13, 14). The improved visual outcome for this study was BCVA < 1.0 logMAR. Around 64.4% of patients met this success criterion, compared with 70% in a group pre-treated with bevacizumab and 56.6% in those not pre-treated (16). This comparison suggests the potential for even better outcomes with preoperative bevacizumab, as noted in the study by Wattool et al. (17).

The analysis of factors influencing visual outcome showed insightful correlations. The strong association between older age (>55 years) and a poorer visual outcome, with a final BCVA >1 logMAR, is a noteworthy observation. This may be attributed to a higher likelihood of coexisting age-related macular pathology or more advanced and ischaemic diabetic retinal disease that is less amenable to surgical intervention. This finding is comparable to that of Nisic et al., who identified younger age as a factor associated with better visual outcomes (18). The powerful link between the presence of comorbidities, specifically hypertension, and a history of ocular surgery and a poor visual result is an important finding. Systemic vascular health, as indicated by hypertension, profoundly impacts retinal recovery and surgical prognosis.

The complication profile in this study is notably favourable. The rate of recurrent vitreous haemorrhage of 2.7% is lower than the 12% reported by Wattool et al. (17). The incidence of tractional retinal detachment at 6.8% and raised intraocular pressure at 9.6% aligns with the 6% and 20% reported by Sultan et al., respectively (13).

These findings lead to several practical suggestions. The strong association of comorbidities with poor outcomes calls for a more integrated care Model where ophthalmic surgeons should work closely with physicians to optimise systemic health, particularly blood pressure control, before intervention. The excellent safety profile and low complication rates observed suggest that the surgical protocols employed were effective and should be maintained.

This study has certain limitations. Its single-centre design and small sample size may affect the generalisability of the findings to other populations. The three-month follow-up period is adequate for assessing initial surgical success and early complications, but it may not capture long-term outcomes. A longer follow-up period would provide a more comprehensive understanding.

CONCLUSION

In conclusion, our study demonstrated a significant improvement in visual outcomes in diabetic patients after PPV for vitreous hemorrhage. A longer duration of diabetes and increasing age were associated with poorer visual outcomes. Fewer postop complications were observed, which were related to poor postop BCVA.

DECLARATIONS

Data Availability Statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRB)

Consent for publication

Approved

Funding

Not applicable

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

BILAL KIFAYAT ORAKZAI (Fellow Vitreoretina)

Data collection, Data analysis, Development of research Methodology design, Article drafting, Review of manuscript, and final approval of manuscript.

SANAULLAH JAN (Professor)

Conception of Study, Study Design, Critical input, and Final approval of manuscript

ASMAT ULLAH (Fellow Vitreoretina)

Literature search, Final approval of manuscript.

MUHAMMAD AMMAR KHAN (Trainee Medical Officer)

Literature search, and Review of manuscript

ABID KHAN (Trainee Medical Officer)

Literature search and Review of manuscript

REFERENCES

1. Fung TH, Patel B, Wilmot EG, Amoaku WM. Diabetic retinopathy for the non-ophthalmologist. Clin Med (Lond). 2022;22(2):112-6. <https://doi.org/10.7861/clinmed.2021-0792>
2. Lundeen EA, Burke-Conte Z, Rein DB, Wittenborn JS, Saaddine J, Lee AY, et al. Prevalence of diabetic retinopathy in the US in 2021. JAMA Ophthalmol. 2023;141(8):747-54. <https://doi.org/10.1001/jamaophthalmol.2023.2038>
3. Arrigo A, Aragona E, Bandello F. VEGF-targeting drugs for the treatment of retinal neovascularization in diabetic retinopathy. Ann Med. 2022;54(1):1089-1111. <https://doi.org/10.1080/07853890.2022.2064541>
4. Bucolo C, Barbieri A, Viganò I, Marchesi N, Bandello F, Drago F, et al. Short and long term expression of VEGF: temporal regulation of a key factor in diabetic retinopathy. Front Pharmacol. 2021;12:707909. <https://doi.org/10.3389/fphar.2021.707909>
5. Jorge DM, Tavares Neto JE, Poli-Neto OB, Scott IU, Jorge R. Intravitreal bevacizumab versus bevacizumab in combination with pars plana vitrectomy for vitreous hemorrhage secondary to proliferative diabetic retinopathy: a randomized clinical trial. Int J Retina Vitreous. 2021;7(1):35. <https://doi.org/10.1186/s40942-021-00296-7>
6. Schreur V, Brouwers J, van Huet RA, Smeets S, Phan M, Hoyng CB, et al. Long term outcomes of vitrectomy for proliferative diabetic retinopathy. Acta Ophthalmol. 2021;99(1):83-9. <https://doi.org/10.1111/aos.14408>

7. Zhang ZH, Liu HY, Hernandez-Da Mota SE, Romano MR, Falavarjani KG, Ahmadi H, et al. Vitrectomy with or without preoperative intravitreal bevacizumab for proliferative diabetic retinopathy: a meta-analysis of randomized controlled trials. *Am J Ophthalmol*. 2013;156(1):106-15. <https://doi.org/10.1016/j.ajo.2013.02.008>
8. Nakao S, Ishikawa K, Yoshida S, Kohno RI, Miyazaki M, Enaida H, et al. Altered vascular microenvironment by bevacizumab in diabetic fibrovascular membrane. *Retina*. 2013;33(5):957-63. <https://doi.org/10.1097/IAE.0b013e3182753b41>
9. Evoy KE, Abel SR. Ranibizumab: the first vascular endothelial growth factor inhibitor approved for the treatment of diabetic macular edema. *Ann Pharmacother*. 2013;47(6):811-8. <https://doi.org/10.1345/aph.1S013>
10. Ding Y, Yao B, Hang H, Ye H. Multiple factors in the prediction of risk of recurrent vitreous haemorrhage after sutureless vitrectomy for non-clearing vitreous haemorrhage in patients with diabetic retinopathy. *BMC Ophthalmol*. 2020;20(1):292. <https://doi.org/10.1186/s12886-020-01532-8>
11. Shaikh N, Srishti R, Khanum A, Mb T, Dave V, Arora A, et al. Vitreous hemorrhage: causes, diagnosis, and management. *Indian J Ophthalmol*. 2023;71(1):28-38. https://doi.org/10.4103/ijo.IJO_1884_22
12. Hoerauf H, Brüggemann A, Muecke M, Lücke J, Müller M, Stefánsson E, et al. Pars plana vitrectomy for diabetic macular edema: internal limiting membrane delamination versus posterior hyaloid removal. A prospective randomized trial. *Graefes Arch Clin Exp Ophthalmol*. 2011;249(7):997-1008. <https://doi.org/10.1007/s00417-010-1610-8>
13. Sultan S, Shakeel A, Khanzada MA, Zaman Y, Kamil Z, Waris N. Surgical outcomes of vitrectomy in patients with complications of diabetic retinopathy at a tertiary care center. *J Liaquat Uni Med Health Sci*. 2021;20(3):187-92. <https://doi.org/10.22442/jlumhs.2021.00843>
14. Haseeb U, Haseeb M, Hadi A, Haseeb S, Mahmood T. Surgical outcomes of pars plana vitrectomy in added and prognostic factors for poor visual outcomes. *J Rawalpindi Med Coll*. 2025;29(2). <https://doi.org/10.37939/jrmc.v29i2.2793>
15. Abdelkader M, Shahin MM, Nwara OL. Function evaluation of diabetic vitreous hemorrhage after vitrectomy. *J Ophthalmol Res Rev Rep*. 2023;4(1):1-8. [https://doi.org/10.47363/JORRR.2022\(4\)140](https://doi.org/10.47363/JORRR.2022(4)140)
16. Haseeb U, Rehman A, Haseeb M. Visual outcomes of pars plana vitrectomy alone or with intravitreal bevacizumab in patients of diabetic vitreous haemorrhage. *J Coll Physicians Surg Pak*. 2019;29(8):728-31. <https://doi.org/10.29271/jcpsp.2019.08.728>
17. Wattoo RR, Iqbal U, Hameed Z. Surgical outcomes of 23 gauge pars plana vitrectomy for non-clearing diabetic vitreous hemorrhage. *J Fatima Jinnah Med Univ*. 2023;17(2):45-8. <https://doi.org/10.37018/JFJMU/ZEE/1997>
18. Nisic F, Pidro Gadzo A, Fajkic A, Nisic A, Pidro Miokovic A, Damjanovic G, et al. Predictors of visual outcome after pars plana vitrectomy secondary to proliferative diabetic retinopathy. *Rom J Ophthalmol*. 2023;67(3):283-8. <https://doi.org/10.22336/rjo.2023.46>

adaptation, distribution, and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons licence unless indicated otherwise in a credit line to the material. Suppose material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use. In that case, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. © The Author(s) 2025



Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing,

[Citation: Orakzai, B.K., Jan, S., Ullah, A., Khan, M.A., Khan, A. (2025). Visual outcome in diabetic patients undergoing pars plana vitrectomy for vitreous hemorrhage. *Pak. J. Inten. Care Med.* 5(2), 2025: 197. doi: <https://doi.org/10.54112/pjicm.v5i02.197>]