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Clinical Outcomes and Safety of 25-Gauge Pars Plana Vitrectomy in Vitreous Haemorrhage

Arshad Mehmood, Saliha Naz, Fawad Rizvi, Zeeshan Kamil, Sahira Wasim, Tanveer Hassan Khan

ABSTRACT

Objectives: This study evaluates the outcomes of 25-gauge pars plana vitrectomy (25G PPV) for dense vitreous haemorrhage (VH) of diverse etiology

Study Design and Settings: This is a prospective interventional study in which 25G PPV was performed for dense VH at a tertiary eye care centre. Eligible cases were selected from surgical retina clinic.

Methodology: All the investigations to determine the cause of VH were performed. Preoperative best corrected visual acuity(BCVA) was measured and then 25G PPV was performed. All the surgeries were done by the same surgeon. BCVA measurements were performed at postoperative day 1(Day1), one-month(1M), and two-month(2M) visits**.** Visual outcome was categorized based on underlying cause of VH

Results: The mean patient age was 51.4 years, with proliferative diabetic retinopathy (40.8%) being the most common aetiology, followed by central retinal vein occlusion (CRVO) and ocular trauma. Surgical intervention resulted in a significant and sustained improvement in visual acuity at all postoperative intervals ($p < 0.001$), with a mean gain of 0.530 logMAR at the two-month endpoint. The magnitude of improvement varied by aetiology; eyes with CRVO demonstrated the largest mean gain (0.784 logMAR), while trauma cases showed modest recovery (0.317 logMAR). The procedure demonstrated a favourable safety profile, with an overall complication rate of 14.3%, primarily consisting of recurrent VH (8.2%).

Conclusion: These findings confirm that 25-gauge PPV is a highly effective and safe intervention for restoring visual function in patients with dense VH, with aetiology serving as a key determinant of the final visual outcome

Keywords: Vitreous Haemorrhage; Diabetic Retinopathy; Central Retinal Vein Occlusion (CRVO); Pars Plana Vitrectomy

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INTRODUCTION:

Vitreous haemorrhage (VH) is a significant cause of vision loss, presenting a considerable challenge to both patients and vitreoretinal surgeons. It is not a disease in itself but it is a manifestation of a variety of underlying retinal diseases. The causes of VH include diabetic retinopathy, retinal vascular occlusion, posterior vitreous detachment (PVD) with or without retinal tear formation, trauma, and exudative age-related macular degeneration (AMD).[1] The common endpoint of these causes is the leakage of blood into the vitreous cavity, which obstructs the transmission of light to the retina. Symptoms vary from floaters and blurred vision to complete visual blackout. The management of VH differs from observation to surgical intervention. In cases of mild vitreous hemorrhage, conservative management is advised initially. This approach allows for spontaneous clearing of the blood. Spontaneous resolution of blood is mediated by red blood cell haemolysis and phagocytosis by retinal pigment epithelial and inflammatory cells.[2] However, this resolution is often slow and incomplete, particularly in patients with a dense VH, which can predispose to secondary ghost cell glaucoma.[3] Furthermore, prolonged obstruction of the visual axis prevents adequate

monitoring of the posterior segment with fundoscopy or optical coherence tomography (OCT). This diagnostic uncertainty is a primary reason for surgical intervention. As the VH may have underlying retinal detachments, tears, or neovessels requiring urgent treatment. The advent of pars plana vitrectomy (PPV) in the 1970s by Machemer and colleagues revolutionized the treatment of may vitreoretinal diseases, including dense VH.[4] The initial technique utilized 20-gauge instruments, which required extensive conjunctival dissection and scleral suturing, leading to prolonged operative times, postoperative inflammation, patient discomfort and slow recovery. The subsequent evolution of vitrectomy technology toward smaller 23-gauge, 25-gauge, and more recently 27-gauge—has marked a paradigm shift in retinal surgery.[5, 6] These micro incisional vitrectomy systems offer numerous advantages. These advantages include self-sealing wounds, less conjunctival scarring, less postoperative inflammation and accelerated patient recovery.[7] Its application in the context of VH is especially important. The primary surgical goals in VH are to clear the optical media, identify the underlying retinal pathology and treat accordingly. While the technical feasibility of 25G PPV for VH is well-established, the visual and anatomical outcomes depend upon the diverse etiologies causing the haemorrhage. A critical analysis of the outcomes of 25G PPV can delineate results based on the aetiology to provide meaningful information for clinicians. Key outcome measures include best-corrected visual acuity (BCVA) improvement, intraoperative and postoperative complications (such as iatrogenic retinal breaks, postoperative hypotony, endophthalmitis, and recurrent haemorrhage). Several studies have investigated outcomes of 25-gauge vitrectomy for specific causes of VH, particularly diabetic VH.[11, 12] However, a comprehensive study that directly compares the surgical outcomes and prognostic factors for various aetiologies within a single surgical framework is less common. This study aims to evaluate the visual and anatomical outcomes and the safety profile of 25G PPV in the management of dense VH due to various etiologies. By systematically analysing and comparing results between groups such as diabetic retinopathy, retinal vascular occlusions, PVD with retinal breaks and trauma, we seek to pinpoint the factors that predict surgical success and visual recovery.

METHODOLOGY

This is a prospective interventional study in which 25-gauge pars plana vitrectomy (25-G PPV) was performed for dense VH. The study was conducted at Layton Rehmatullah Benevolent Trust (LRBT) Tertiary Teaching Eye Hospital Karachi, Pakistan from June 2024 to June 2025. The study was conducted in accordance with the principles of the Declaration of Helsinki and received approval from the Institutional Review Board/Ethics Committee. Eligible cases were selected form surgical retina clinic.

The patients of both genders with age more than 18 years having non-resolving VH of grade 3 or 4 due to any cause were included in the study. Severity of vitreous hemorrhage was graded from 0 to 4 according to Nussenblat vitreous haze scale(5): Grade 0(No vitreous hemorrhage); Grade 1(optic disc and retinal vessels clearly visible); Grade 3(optic disc or retinal vessels barely visible);Grade 4(no view of the fundus, optic disc not visible).Those excluded were patients with age less than 18 years and patients with any other ocular condition such as retinal detachment, uveitis, glaucoma and endophthalmitis.

All patients underwent comprehensive ophthalmic examination including best corrected visual acuity (BCVA), slit lamp examination, fundus examination with +90 D lens, intraocular pressure (IOP) checked with Goldman applanation tonometer, B-scan was performed if there was no view of fundus. BCVA was done using Snellen chart and then it was converted to LogMAR BCVA. The collected data included demographics of the patients, preoperative and postoperative BCVA, date of admission, date of surgery, date of discharge and any complications. Blood pressure in all the patients, fasting blood sugar and HbA1C in diabetics was performed. Systemic investigations were done to find out the cause of VH according to clinical suspicion. Moreover, the cause of vitreous hemorrhage was noted during surgery.

All patients were operated at LRBT Tertiary Teaching Eye Hospital by the same surgeon. All the patients were informed about the benefits and risks of surgery and written consent was taken. Peribulbar anesthesia was used. Under all aseptic measures, pars plana ports were passed. Core vitrectomy was performed and vitreous base was shaved. Laser photocoagulation(endolaser) was done depending upon the intraoperative findings. Gas(C3F8) or silicon oil was used for tamponade and ports were closed. Sclerotomies were closed with sutures if leakage was observed.

Patients followed a standard postoperative regimen of topical antibiotics and steroids. Scheduled follow-up examinations occurred on postoperative day 1, at one month, and at two months. Each visit included measurement of BCVA, assessment of intraocular pressure, and a dilated fundus examination. Additional visits were scheduled as clinically indicated

Outcomes: The primary outcome measure was the change in BCVA from the preoperative baseline to the two-month postoperative visit, calculated as ÄBCVA(Pre>2M) = Preop logMAR ? 2M logMAR, where a positive value denotes visual improvement. Secondary outcomes included the change in BCVA at day one and one month, the distribution of BCVA scores, the proportion of eyes achieving clinically meaningful visual gains (defined as a ÄBCVA ?0.3 and ?0.5 logMAR), and the incidence of postoperative complications. Predefined complications included recurrent VH, cataract progression, and endophthalmitis.

Subgroup Definitions and Statistical Analysis: Analyses

were conducted for the overall cohort and for the five most prevalent etiological subgroups: diabetic retinopathy (DM, n=20), central retinal vein occlusion (CRVO, n=5), trauma (n=4), unknown aetiology (n=3), and hypertension (HTN, n=2). Aetiologies represented by only a single case were described visually but were excluded from formal comparative statistical testing due to their small sample sizes.

Continuous variables are presented as mean ± standard deviation and median. Categorical variables are summarized as counts and percentages (n, %). Within-eye changes in BCVA were analysed using paired t-tests for comparisons between preoperative values and day one and one-month values. The two-month change is presented as a mean ÄBCVA. The proportions of eyes achieving predefined visual gain thresholds were calculated. All analyses were performed using Python with standard data science libraries (pandas, matplotlib).

RESULTS:

A total of 49 eyes underwent 25G PPV for dense VH. The cohort had a mean age of 51.4 ± 10.3 years. A male predominance was observed, with males comprising 55.1% (n=27) of the cohort, females 26.5% (n=13). The etiology of VH was diverse, with PDR being the most common cause, accounting for 40.8% (n=20) of cases. This was followed by central retinal vein occlusion (CRVO) (10.2%, n=5) and ocular trauma (8.2%, n=4). Other less frequent causes included hypertension (4.1%, n=2), unknown etiology (6.1%, n=3), and several other conditions—such as BRVO, Eales disease, and PVD with retinal tear—each represented by a single case (Figure 1). Pre-operatively, patients presented with significant visual impairment. The mean baseline BCVA was 0.964 ± 0.269 logMAR. The data analysis revealed distinct demographic and clinical patterns. Patients with diabetic VH were older (mean age 54.3 ± 8.8 years), as were those with CRVO (50.8 ± 9.0 years), while trauma patients were significantly younger (32.0 ± 5.0 years). Postoperative recovery depends upon the severity of the preoperative condition. Eyes with CRVO, which had the poorest baseline acuity (1.156 logMAR), showed substantial improvement to 0.467 at day one and 0.396 at one month. The diabetic subgroup improved from 0.980 to 0.523 and 0.430 logMAR at the same intervals. On the other hand, trauma cases showed more modest early gains (1.075 ? 0.834 ? 0.703 logMAR). However, eyes with VH of unknown etiology and hypertensive retinopathy demonstrated excellent visual outcomes, improving from 0.719 to 0.318 to 0.276 logMAR and from 0.889 to 0.327 to 0.239 logMAR, respectively.

Distribution of Preoperative vs. 2-Month BCVA: A significant shift in the visual acuity from profound impairment to significantly better function was observed by the two-month postoperative period (Table 4). For the overall cohort, the mean preoperative BCVA was 0.964 ± 0.269 logMAR (median 1.000, IQR 0.778–1.000), which improved substantially to a mean of 0.434 ± 0.253 logMAR (median 0.301, IQR 0.301–0.523) at two months. This transformation was evident across most etiological subgroups. Eyes with central retinal vein occlusion (CRVO), which presented with the poorest mean baseline acuity (1.156 ± 0.356 logMAR, median 1.000), achieved one of the best mean final acuity(0.371 ± 0.234 logMAR, median 0.301), demonstrating one of the largest improvements. A similar pattern was seen in the diabetic subgroup (DM), which improved from a preoperative mean of 0.980 ± 0.230 logMAR to 0.476 ± 0.277 logMAR at two months. Eyes with trauma-related VH started with a high baseline (1.075 ± 0.151 logMAR) but showed more modest recovery, settling at a mean of 0.758 ± 0.215 logMAR (median 0.778). In contrast, eyes with vitreous hemorrhage of unknown etiology and those secondary to hypertension (HTN) achieved the best final visual outcomes, with mean two-month acuities of 0.218 ± 0.072 logMAR and 0.239 ± 0.088 logMAR, respectively. As a whole, these changes confirm the high efficacy of this procedure. Improvement in VA also indicates that the largest gains were achieved in eyes that presented with the poorest vision preoperatively (Table 1). Etiology Specific Improvement in BCVA after 2 months: The magnitude of visual improvement at the two-month postoperative interval depicted wide variation based on the underlying etiology of the VH. Eyes with hemorrhage secondary to central retinal vein occlusion (CRVO, n=5) exhibited the most substantial median gain of approximately 0.68 logMAR units. This group also displayed the widest overall range (~0.20–1.40), indicating both the highest potential for recovery and the greatest variability in outcomes (Figure 6A). In contrast, eyes with trauma-related VH (n=4) demonstrated more modest recovery, with a lower improvement of approximately 0.26 logMAR units, suggesting a more consistent but limited visual gain in this subgroup (Figure 6B). Cases with an unknown etiology (n=3) showed consistent, mid-range improvement, with a median Ä of 0.48 logMAR units, reflecting a homogeneous response to surgical intervention (Figure 6C). Despite the small sample size, the two cases of hypertension-related VH showed robust results, with a median improvement of approximately 0.65 logMAR units (Figure 6D). These etiology-specific patterns occurred within the context of a highly significant mean improvement for the entire cohort at two months (0.53 ± 0.28 logMAR units; $p < 0.001$).

Visual Acuity Outcomes: Postoperative visual acuity demonstrated a characteristic pattern of initial mild decline followed by significant improvement. This positive trend continued and the best mean visual acuity outcomes were achieved after two-months. Mean BCVA across all study timepoints clearly shows this initial dip and subsequent rapid recovery, confirming a significant overall visual improvement (Figure 2).

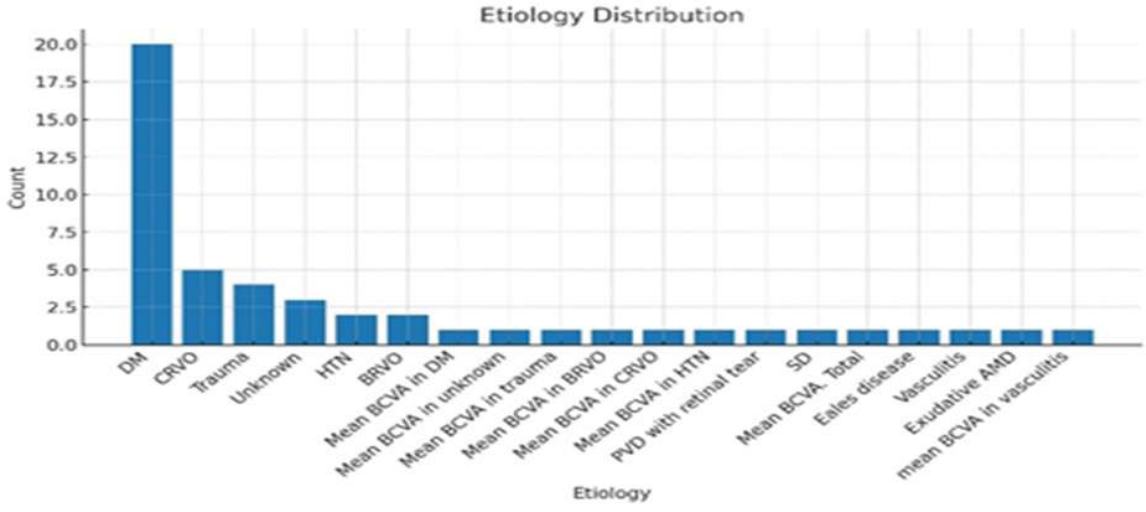
Line graph showing the mean BCVA (in logMAR units) across the preoperative, Day 1, one-month (1M), and two-month (2M) postoperative timepoints, demonstrating the trend of visual recovery over time. Visual acuity is presented in logarithm of the minimum angle of resolution (logMAR) units, where a decrease in value represents an improvement in visual acuity. Statistical analysis confirmed a significant improvement in visual acuity across the entire cohort at all postoperative intervals (Table 2). The mean change from preoperative baseline (ÄBCVA) was 0.458 ± 0.243 logMAR at day one ($t = 13.20$, $p < 0.001$), which increased to 0.549 ± 0.267 logMAR at one month ($t = 14.42$, $p < 0.001$). This substantial improvement was maintained at the two-month endpoint, with a mean gain of 0.530 logMAR. When stratified by etiology, the magnitude of improvement varied. Eyes with CRVO demonstrated the largest gain, with a mean ÄBCVA of 0.689 ± 0.367 logMAR at day one ($p = 0.0137$), 0.759 ± 0.458 logMAR at one month ($p = 0.0207$), and 0.784 logMAR at two months. The DM subgroup, exhibited highly significant and sustained improvements (ÄDay1 = 0.457 ± 0.218, $p < 0.001$; Ä1M = 0.550 ± 0.276, $p < 0.001$; Ä2M = 0.504). Eyes with trauma-related haemorrhage showed more modest early gains that became significant by one month (ÄDay1 = 0.242 ± 0.215, $p = 0.1098$; Ä1M = 0.372 ± 0.174, $p = 0.0234$; Ä2M = 0.317). Complications and Safety Outcomes: The 25G PPV procedure demonstrated good safety profile in the management of VH. Overall, intraoperative and postoperative complications were uncommon, occurring in only 7 of the 49 eyes (14.3%). The vast majority of procedures, 42 eyes (85.7%), were completed without any complications (Table 4). The most frequent complication was recurrent VH, which occurred in 4 eyes (8.2%). This was followed by accelerated cataract, which was noted in 2 phakic eyes (4.1%), and a single case of endophthalmitis (2.0%). The complication rate is variable and depends on the cause of VH. Both the diabetic (DM) and central retinal vein occlusion (CRVO) groups had a complication rate of 20.0%. Within the DM group, recurrent VH was the primary concern (15.0%), with a smaller proportion developing cataract (5.0%). The CRVO subgroup's complications consisted entirely of recurrent VH (20.0%). The highest rate of complications was observed in the trauma subgroup (50.0%), which was comprised of one eye that developed cataract (25.0%) and one that developed endophthalmitis (25.0%). Notably, no complications were recorded in the subgroups with VH of unknown aetiology or VH secondary to HTN (Table 3). Key Outcome KPIs at 2 Months After 25-G PPV: Key performance indicators (KPI) after two-month postoperative interval confirmed significant improvement across the cohort. The mean visual acuity improvement (Ä1-2M)) was 0.530 logMAR units, with 85.7% of eyes (42/49) achieving a clinically meaningful gain of =0.3 logMAR units. Notably, a majority of eyes, 59.2% (29/49), achieved an even more robust improvement of =0.5 logMAR units (Table 4). Etiology based analysis revealed that eyes with CRVO demonstrated the largest mean improvement (Ä1-2M) of 0.784, followed by hypertension-related VH (0.651) and diabetic retinopathy (0.504), while trauma cases showed less average gain (0.317).

As a whole, these KPIs demonstrate that 25G PPV resulted in meaningful visual gains in most eyes, with the most substantial improvements occurring in aetiologies that presented with the poorest baseline acuity.

DISCUSSION:

This study provides analysis of the improvement in visual outcomes and safety profile of 25G PPV in the management of VH caused by various retinal diseases. The results

Figure 1. Bar graph showing the various causes of vitreous hemorrhage(n=49)



DM: Diabetes Mellitus; CRVO: Central Retinal Vein Occlusion. HTN: Hypertension. BRVO: Branch retinal vein occlusion.

Table 1. Distribution of Preoperative and 2-Month Postoperative Visual Acuity by Etiological Group

Group	Preop_mean	Preop_SD	Preop_median	Preop_Q1	Preop_Q3	M2_mean	M2_SD	M2_median	M2_Q1
Overall	0.964	0.269	1	0.778	1	0.434	0.253	0.301	0.301
DM	0.98	0.23	1	0.778	1.075	0.476	0.277	0.301	0.301
CRVO	1.156	0.356	1	1	1.301	0.371	0.234	0.301	0.301
Trauma	1.075	0.151	1	1	1.075	0.758	0.215	0.778	0.703
Unknown	0.719	0.102	0.778	0.69	0.778	0.218	0.072	0.176	0.176
HTN	0.889	0.157	0.889	0.834	0.945	0.239	0.088	0.239	0.207

Figure 2. Postoperative Best-Corrected Visual Acuity (BCVA) Outcomes

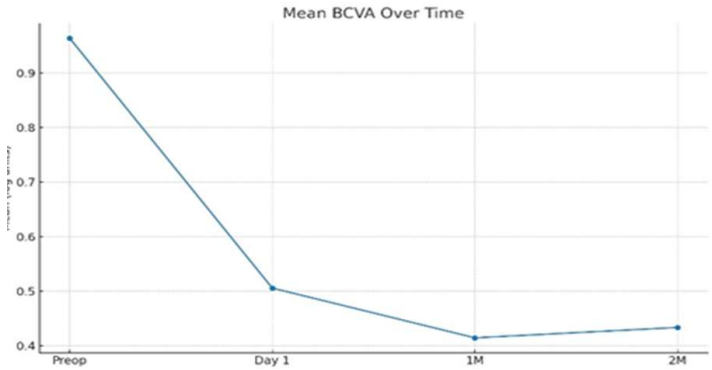


Table 2. Mean Change in Visual Acuity (ÄBCVA) and Paired T-Test Results by Etiological Group

Group	Day1_(mean)	Day1_(SD)	t_Day1	p_Day1	1M_(mean)	1M_(SD)	t_1M	p_1M	2M (mean)
Overall	0.458	0.243	13.201	0	0.549	0.267	14.415	0	0.53
DM	0.457	0.218	9.361	0	0.55	0.276	8.896	0	0.504
CRVO	0.689	0.367	4.201	0.0137	0.759	0.458	3.709	0.0207	0.784
Trauma	0.242	0.215	2.251	0.1098	0.372	0.174	4.285	0.0234	0.317
Unknown	0.401	0.174	4	0.0572	0.443	0.151	5.074	0.0367	0.502
HTN	0.401	0.056	14.207	0.0447	0.651	0.069	13.425	0.0473	0.651

Table 3. Incidence and Distribution of Postoperative Complications by Etiological Group

Group	Total Complications (n)	Total Complications (%)	Recurrent VH (n)	Recurrent VH (%)	Cataract (n)	Cataract %
Overall	7	14.30%	4	8.20%	2	4.10%
DM	4	20.00%	3	15.00%	1	5.00%
CRVO	1	20.00%	1	20.00%	0	0.00%
Trauma	2	50.00%	0	0.00%	1	25.00%
Unknown	0	0.00%	0	0.00%	0	0.00%
HTN	0	0.00%	0	0.00%	0	0.00%

Table 4. Key Performance Indicators (KPIs) of Visual Outcomes and Safety at 2 Months by Etiological Group

Group	N	Preop (mean)	M2 (mean)	Ä1-2M (mean)	Complication (n)
Overall	49	0.964	0.434	0.53	7
DM	20	0.98	0.476	0.504	4
CRVO	5	1.156	0.371	0.784	1
Trauma	4	1.075	0.758	0.317	2
Unknown	3	0.719	0.218	0.502	0
HTN	2	0.889	0.239	0.651	0

demonstrate that this minimally invasive surgical approach is highly effective, yielding significant visual improvement in the vast majority of patients. Moreover, the complication rate of 25G PPV is low.

The study population shows a characteristic profile of VH patients in which middle aged patients are predominant. Etiological distribution of this study population shows that the most common cause of VH is proliferative diabetic retinopathy (PDR) (40.8%) which is consistent with global epidemiological data.[1, 2] The baseline visual impairment (mean BCVA 0.964 logMAR) highlights the sight-threatening nature of dense VH. The rapid and substantial visual recovery observed—with a mean improvement of 0.458 logMAR by post-operative day 1 that increased to 0.530 logMAR by two months—highlights the efficacy of 25-G PPV. This procedure is effective in clearing the optical media and addressing the underlying pathology. Many previous studies on vitrectomy have reported similar results of early visual rehabilitation.[3, 4] The initial slight dip in vision on day one, followed by rapid recovery, is a recognized phenomenon often due to postoperative inflammation and use of vitreous tamponading agents.[5]

An important finding of this study is the significant influence of etiology on both the magnitude of visual gain and the final visual outcome. Eyes with central retinal vein occlusion (CRVO) and exudative AMD demonstrated the largest absolute improvements (Ä2M 0.784 and ?0.92 logMAR, respectively), despite having the poorest preoperative BCVA. It indicates that the profound visual loss in these conditions is largely due to the reversible effect of vitreous opacification rather than solely irreversible damage to the photoreceptors or macula. However, it is noteworthy that eyes with exudative AMD still had the poorest final mean acuity (0.78 logMAR), reflecting the vision-limiting nature of the choroidal neovascular membrane itself .[6] On the other hand, the poor gains in the trauma subgroup (Ä2M 0.317) likely reflect the coexistence of other sight-threatening injuries such as choroidal rupture, macular scarring, or optic nerve damage.[7] The excellent outcomes in the hypertension and unknown etiology groups suggest that in the absence of other retinal pathologies, VH clearance alone can restore excellent visual function.

The analysis of correlating factors yielded two critical insights. First, the lack of a significant correlation between age and visual improvement is an encouraging finding, suggesting that advanced age should not be a deterrent to surgical intervention in patients with VH. Second, and perhaps more importantly, was the strong inverse correlation between preoperative BCVA and the degree of postoperative improvement. Eyes with the worst initial vision achieved the greatest gains. It indicates that even eyes with profound visual loss from VH have good potential for meaningful recovery following vitrectomy.

25-G PPV has favorable safety profile as the overall complication rate is 14.3%. Recurrent vitreous haemorrhage was the most common complication (8.2%), a known risk in eyes with active neovascularization, such as in PDR and CRVO.[8] The higher complication rate in the trauma subgroup (50%) highlights the increased complexity and contamination risk associated with open-globe injuries.[9] The absence of complications in the hypertension and unknown etiology groups further highlights that the risk of surgical complications is linked to the underlying disease.

The assessment of key performance indicators solidifies the clinical relevance of the findings. With 85.7% of eyes achieving a clinically meaningful gain (=0.3 logMAR) and 59.2% achieving a robust gain (=0.5 logMAR), 25-G PPV proves to be a highly successful intervention. The high success rates in the diabetic subgroup (85% =0.3 gain) are particularly significant, given that PDR is the most common indication for vitrectomy worldwide and often carries a guarded prognosis.[10, 11]

CONCLUSION:

In conclusion, this study demonstrates that 25G PPV is a highly effective and safe procedure for the management of vitreous haemorrhage of diverse etiology. It facilitates rapid and significant visual rehabilitation, with the greatest benefits observed in eyes with the most severe visual impairment. The underlying cause of haemorrhage is the primary determinant of improvement in the final visual acuity, while patient age does not significantly influence outcomes. These results provide robust evidence to guide decision-making reinforcing the role of PPV as a cornerstone in the management of dense VH.

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Authors Contribution:
Arshad Mehmood: Intro, Literature Review, data collection, Data analysis
Saliha Naz: Literature Review, data collection, result
Fawad Rizvi: Literature Review, data collection, Data analysis
Zeeshan Kamil: Review the article, Result and Data analysis
Sahira Wasim: Literature Review, Data Collection,
Tanveer Hassan Khan: Data Collection, Data analysis

REFERENCES

1. Spraul CW, Grossniklaus HE. Vitreous hemorrhage. Survey of ophthalmology. 1997 Jul 1;42(1):3-9.. DOI: https://doi.org/10.1016/s0039-6257(97)84041-6
2 . Kwon W, Freeman SA. Phagocytosis by the retinal pigment epithelium: recognition, resolution, recycling. Frontiers in immunology. 2020 Nov 13;11:604205. DOI: https://doi.org/10.3389/fimmu.2020.604205
3. Campbell DG, Simmons RJ, Grant WM. Ghost cells as a cause of glaucoma. Am J Ophthalmol. 1976;81(4):441–50. DOI : https://doi.org/10.1016/0002-9394(76)90299-3

4. Machemer R. Pars plana vitrectomy. Removal of preretinal membranes. Transactions. Section on Ophthalmology. American Academy of Ophthalmology and Otolaryngology. 1976 May 1;81(3 Pt 1):420-5.
5. Fujii GY, De Juan E Jr, Humayun MS, et al. A new 25-gauge instrument system for transconjunctival sutureless vitrectomy surgery. Ophthalmology. 2002;109(10):1807–12. DOI: https://doi.org/10.1016/s0161-6420(02)01179-x
6. Eckardt C, Paulo EB. Heads-up surgery for vitreoretinal procedures: an experimental and clinical study. Retina. 2016 Jan 1;36(1):137-47. DOI:https://doi.org/10.1097/iae.0000000000000689
7. Singh A, Stewart JM. 25-Gauge vitrectomy. Ophthalmol Clin North Am. 2004;17(2):201–6. DOI: https://doi.org/10.1159/000360448
8. Hayreh SS, Podhajsky PA, Zimmerman MB. Natural history of visual outcome in central retinal vein occlusion. Ophthalmology. 2011;118(1):119–33DOI: https://doi.org/10.1016/j.ophtha.2010.04.019
9. Sarrafizadeh R, Hassan TS, Ruby AJ, et al. Incidence of retinal detachment and visual outcome in eyes presenting with posterior vitreous detachment and dense fundus-obscuring vitreous hemorrhage. Ophthalmology. 2001;108(12):2273–8 DOI : https://doi.org/10.1016/s0161-6420(01)00822-3
10. Johnston PB. Traumatic retinal detachment. Br J Ophthalmol. 1991;75(1):18–21. DOI: https://doi.org/10.1136/bjo.75.1.18
11. Chen SN, Lian IeB, Wei YJ. Clinical outcomes and complications of 25-gauge transconjunctival sutureless vitrectomy for proliferative diabetic retinopathy. Eye (Lond). 2017;31(12):1700–6. DOI : https://doi.org/10.1159/000328407
12. Shimizu H, Nakashima H, Uchida E, Kato M, Koga T, Hattori T. Outcomes of 25-gauge vitrectomy for vitreous hemorrhage associated with proliferative diabetic retinopathy. Clin Ophthalmol. 2019;13:1543–51. DOI: https://doi.org/10.1007/s00417-010-1506-7
13. Oshima Y, Wakabayashi T, Sato T, Ohji M, Tano Y. A 27–gauge instrument system for transconjunctival sutureless microincision vitrectomy surgery. Ophthalmology. 2010;117(1):93-102. doi:10.1016/j.ophtha.2009.06.058
14. Sharma T, Fong A, Lai TY, Lee V, Das S, Lam D. Surgical treatment for diabetic vitreoretinal diseases: a review. Clin Exp Ophthalmol. 2016;44(4):340-54. doi:10.1111/ceo.12687
15. de Bustros S, Thompson JT, Michels RG, Rice TA. Vitrectomy for progressive proliferative diabetic retinopathy. Arch Ophthalmol. 1987;105(2):196-9. doi:10.1001/archopht. 1987.01060020090033
16. Hayreh SS, Podhajsky PA, Zimmerman MB. Natural history of visual outcome in central retinal vein occlusion. Ophthalmology. 2011;118(1):119-33. doi:10.1016/j.ophtha.2010.04.019
17. Sarrafizadeh R, Hassan TS, Ruby AJ, Williams GA, Garretson BR, Capone Jr A, Trese MT, Margherio RR. Incidence of retinal detachment and visual outcome in eyes presenting with posterior vitreous separation and dense fundus-obscuring vitreous hemorrhage. Ophthalmology. 2001;108(12):2273-8. doi:10.1016/S0161-6420(01)00843-8
18. Johnston PB. Traumatic retinal detachment. Br J Ophthalmol. 1991;75(1):18-21. doi:10.1136/bjo.75.1.18
19. Shimizu H, Nakashima H, Uchida E, Kato M, Koga T, Hattori T. Outcomes of 25-gauge vitrectomy for vitreous hemorrhage associated with proliferative diabetic retinopathy. Clin Ophthalmol. 2019;13:1543-1551. doi:10.2147/OPTH.S207840
20. Gupta OP, Weichel ED, Regillo CD, et al. Postoperative complications associated with 25-gauge pars plana vitrectomy. Ophthalmic Surg Lasers Imaging. 2007;38(4):270-275. doi:10.3928/15428877-20070701-07
21. Rosenfeld PJ, Brown DM, Heier JS, et al. Ranibizumab for neovascular age-related macular degeneration. N Engl J Med. 2006;355(14):1419-1431. doi:10.1056/NEJMoa054481
22. Johnston PB. Traumatic retinal detachment. Br J Ophthalmol. 1991;75(1):18-21. doi:10.1136/bjo.75.1.18
23. Gupta B, Wong R, Sivaprasad S, Williamson TH. Surgical and visual outcome following 20-gauge vitrectomy in proliferative diabetic retinopathy over a 10-year period: evidence for change in practice. Eye (Lond). 2012;26(4):576-582. doi:10.1038/eye.2011.348
24. Fujii GY, De Juan E Jr, Humayun MS, et al. Initial experience using the transconjunctival sutureless vitrectomy system for vitreoretinal surgery. Ophthalmology. 2002;109(10):1814-1820. doi:10.1016/S0161-6420(02)01259-5
25. Shaikh Y, Elmariah H, Jones SM. Advanced vitreoretinal surgery techniques for the treatment of complex vitreoretinal diseases. Curr Opin Ophthalmol. 2018;29(3):212-217. doi:10.1097/ICU.0000000000000464