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Original Article

Ophthalmology Section

A Prospective Observational Study on Vitreous Haemorrhage from a Tertiary Care Hospital in Southern India

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ABSTRACT

Introduction: Blood within the vitreous cavity is referred to as Vitreous Haemorrhage (VH). VH is one of the most frequent conditions that present to the emergency room and is a major cause of painless visual loss.

Aim: To evaluate the various aetiologies, management strategies, and outcomes following treatment in patients with VH.

Materials and Methods: A prospective observational study was conducted at the Ophthalmology Department from August 2023 to August 2024 for a period of one year at Great Eastern Medical School and Hospital, Srikakulam, Andhra Pradesh, India. Newly diagnosed cases of vitreous haemorrhage in patients over 35 years of age were included in the study and those with a history of retinal detachment were excluded. A detailed history regarding the aetiology of the VH was taken, and a complete ocular examination was performed. Necessary investigations were conducted. Treatment was administered according to the cause of VH, and this was noted. Follow-up was conducted for a three-month postoperative period. Statistical analysis was performed using Statistical Packages of Social Sciences (SPSS) software and Microsoft Excel.

Results: The current study included 21 patients with a total of 23 eyes. The largest group of patients was in the age range of 45 to 50 years (42.85%), with a mean age of 54.38±3.438 years. Proliferative Diabetic Retinopathy (PDR) was determined to be the most frequent cause, seen in 11 patients (52.38%), followed by Central Retinal Vein Occlusion (CRVO), seen in 5 cases (23.80%). Anti-vascular Endothelial Growth Factor (VEGF) injections were the most commonly used treatment method, administered in 10 (43.47%) of the 23 eyes. Other treatment options included observation, laser photocoagulation, and Pars Plana Vitrectomy (PPV). Preoperative visual acuity was <1/60 to Perception of Light (PL) + in 12 (52.17%) cases, while in the postoperative follow-up, the majority of patients (20 cases, or 86.94%) were in the visual acuity group of 6/6 to 6/60.

Conclusion: In the present study, the most common cause of vitreous haemorrhage was found to be PDR. Early diagnosis and timely intervention for VH lead to good visual prognosis.

Keywords: Intraocular pressure, Pan retinal photocogulation, Pars plana vitrectomy, Tractional retinal detachment, Vitreous humour

INTRODUCTION

The vitreous humour is the largest intraocular structure, comprising 80% of the ocular volume. It is a highly hydrated tissue, consisting of approximately 99% water and 0.9% salts [1]. The remaining 0.1% is divided between proteins and polysaccharide components, which are arranged in the form of a meshwork of collagen fibrils interspersed with glycosaminoglycan molecules [1]. The total volume of the vitreous is about 4 mL, filling the space of the eyeball, bounded anteriorly by the posterior lens capsule and posteriorly by the internal limiting membrane of the neural retina [2].

Vitreous haemorrhage defined as the presence of extravasated blood in the vitreous cavity, situated between the posterior lens capsule and the zonules of the lens anteriorly, the non pigmented epithelium of the ciliary body, and the internal limiting membrane laterally and posteriorly [3].

The mechanisms for vitreous haemorrhage can include bleeding from abnormal vessels in diseases such as proliferative diabetic retinopathy, retinal vein occlusion, retinopathy of prematurity, retinal vasculitis, and proliferative sickle cell retinopathy, among others [4,5]. It can also arise from the disruption of normal retinal vessels due to trauma, Terson syndrome, hematological disorders [5-7], or extension of haemorrhage through the retina from an adjacent source [8].

The typical clinical presentation includes an acute onset of painless visual acuity loss. The visual acuity varies depending on the location, size, and degree of VH [5].

The management of VH depends on the aetiology of the haemorrhage, its duration, laterality, and associated ocular conditions. Principles of management include observation, the use of laser therapy [9,10], anti-vascular endothelial growth factor treatments, pharmacological agents [11,12], and vitrectomy [13,14].

The goal of research on vitreous haemorrhage is to better understand and treat the wide range of disorders that can impair vision. The present research is crucial for enhancing patient outcomes, preventing avoidable blindness, and fostering innovation in eye care. Therefore, the aim of the present study was to evaluate various aetiologies, management strategies, and outcomes following treatment in patients with VH.

MATERIALS AND METHODS

A prospective observational study was conducted in the Ophthalmology Department of Great Eastern Medical School and Hospital, Srikakulam, Andhra Pradesh, India from August 2023 to August 2024, lasting one year. A total of 23 eyes from 21 patients with VH were included in the study after obtaining informed consent. All 21 patients visiting the Ophthalmology Department during the study period were included. The study commenced after receiving ethics approval from the Ethical Committee (letter no. 149/IEC/GEMS & H/2023). Newly diagnosed cases of VH in patients aged over 35 years were included in the study.

Patients with co-existing conditions such as neovascularisation of the iris, neovascular glaucoma, those with no PL, and those with a history of retinal detachment were excluded.

A detailed medical history was taken, including present complaints and systemic history regarding diabetes, hypertension, dyslipidemia,

heart disease, any bleeding disorders, trauma, or drug intake. A complete ocular examination was performed. Anterior segment examination was conducted using a slit lamp, and Intraocular Pressure (IOP) was measured with Non Contact Tonometry (NCT). Visual acuity was assessed using a Snellen chart, and best-corrected visual acuity was recorded. Dilated posterior segment examination was performed using indirect ophthalmoscopy and a +90 D slit lamp examination. Additionally, an ultrasound (B-scan) examination was completed for all cases.

Systemic investigations, including Fasting Blood Sugar (FBS), Postprandial Blood Sugar (PPBS), and glycosylated haemoglobin levels, were checked. Blood pressure was recorded, and additional investigations such as serum lipid profile, electrocardiogram, and CT scan were conducted in cases of trauma.

Data was collected on the treatments administered based on the underlying cause and standard protocol, which included observation, laser therapy, anti-VEGF injections, Panretinal Photocoagulation (PRP), or vitrectomy. Case follow-up was conducted for three months postoperatively, and final visual acuity was noted.

STATISTICAL ANALYSIS

Categorical data were recorded as frequency and percentage, while quantitative data were presented as mean and Standard Deviation (SD). Data were tabulated using MS Excel.

RESULTS

In present study, 21 newly diagnosed patients with VH were included. Of these, 16 (76.19%) were males and 5 (23.80%) were females [Table/Fig-1]. The age range of the study population was 36-72 years, with the largest age group, 9 patients (42.85%), in the 41-50 year range [Table/Fig-2]. The mean age was 54.38±3.438 years.

Gender	n (%)
Male	16 (76.19%)
Female	05 (23.80%)

[Table/Fig-1]: Gender distribution.

Age (in years)	n (%)
<40	1 (4.76%)
41-50	9 (42.85%)
51-60	6 (28.57%)
61-70	4 (19.04%)
>70	1 (4.76%)

[Table/Fig-2]: Age distribution.

Out of the 23 eyes from 21 patients, 19 patients (90.47%) had unilateral presentation while 2 patients (9.52%) had bilateral presentation [Table/Fig-3]. In these two patients, the cause of VH was PDR in both eyes. Among the 21 patients, 10 had diabetes mellitus (47.61%), 5 had hypertension (23.80%), and 6 were suffering from both diabetes mellitus and hypertension (28.57%) [Table/Fig-4].

Laterality	n (%)
Unilateral	19 (90.47%)
Bilateral	02 (9.52%)

[Table/Fig-3]: Laterality of presentation.

Co-morbidities	n (%)
Diabetes mellitus	10 (47.61%)
Hypertension	5 (23.80%)
Diabetes mellitus and hypertension	6 (28.57%)

[Table/Fig-4]: Co-morbidities in patients with VH.

It was noted that in 11 patients (52.38%), the cause was determined to be PDR, followed by Central Retinal Vein Occlusion (CRVO) in 5 patients (23.80%) [Table/Fig-5]. A total of 13 eyes from 11 patients with PDR were included in the study. The management of VH due to PDR included anti-VEGF injections, anti-VEGF followed by Pars Plana Vitrectomy (PPV), Panretinal Photocoagulation (PRP), PPV, and observation.

Systemic association	n (%)
Proliferative Diabetic Retinopathy (PDR)	11 (52.38%)
Central Retinal Vein Occlusion (CRVO)	05 (23.80%)
Trauma	04 (19.04%)
Vasculitis /Eales disease	01 (4.76%)

[Table/Fig-5]: Systemic association of Vitreous Haemorrhage (VH).

Total 6 (46.15%) were managed solely with anti-VEGF injections, while 4 eyes (30.76%) received anti-VEGF followed by PPV [Table/Fig-6]. For the management of VH due to other causes, anti-VEGF was administered in 4 eyes (40%), followed by observation in 3 eyes (30%) [Table/Fig-7].

Parameters	n (%)
Observation	1 (7.69%)
Anti-VEGF	6 (46.15%)
Anti-VEGF f/b PPV	4 (30.76%)
PPV	1 (7.69%)
Anti-VEGF f/b PRP	1 (7.69%)

[Table/Fig-6]: Management of VH due to proliferative diabetic retinopathy (n=13). (VEGF: Vascular endothelial growth factor; PPV: Pars plana vitrectomy; PRP: Pan retinal photo-coagulation: f/b = followed by

Parameters	n (%)
Observation	3 (30%)
Anti-VEGF	4 (40%)
Anti-VEGF f/b PPV	2 (20%)
PPV	1 (10%)

[Table/Fig-7]: Management of VH due to other causes (n=10).

The visual acuity at the time of presentation was noted in all cases. The maximum number of eyes, 12 (52.17%), presented with visual acuity ranging from <1/60 to Perception of Light (PL+) [Table/Fig-8]. Follow-up assessments were conducted at one week, four weeks, and three months, with final visual acuity recorded for all eyes. The majority of eyes, 20 (86.94%), fell into the visual acuity category of 6/6 to 6/60 [Table/Fig-9]. Two patients showed no improvement due to complications such as tractional retinal detachment and glaucoma [Table/Fig-10]. They were managed with PPV, traction release, silicone oil infusion, and anti-glaucoma medication.

BCVA	n (%)
6/18 - 6/60	2 (8.69%)
<6/60 -3/60	4 (17.39%)
<3/60- 1/60	5 (21.73%)
<1/60 - PL	12 (52.17%)

[Table/Fig-8]: Visual acuity at the time of presentation (n=23 eyes). BCVA Best-corrected visual acuity

BCVA	n (%)
6/6- 6/18	10 (43.47%)
<6/18 -6/60	10 (43.47%)
<6/60- 3/60	1 (4.34%)
<1/60	2 (8.69%)

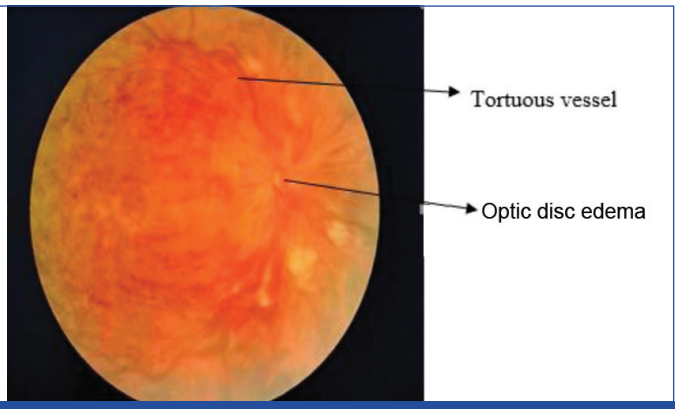
[Table/Fig-9]: Postoperative visual acuity at three months.

Fundus imaging revealed an edematous optic disc with tortuous vessels, multiple superficial haemorrhages scattered across all quadrants, and the presence of cotton wool spots [Table/Fig-11a].

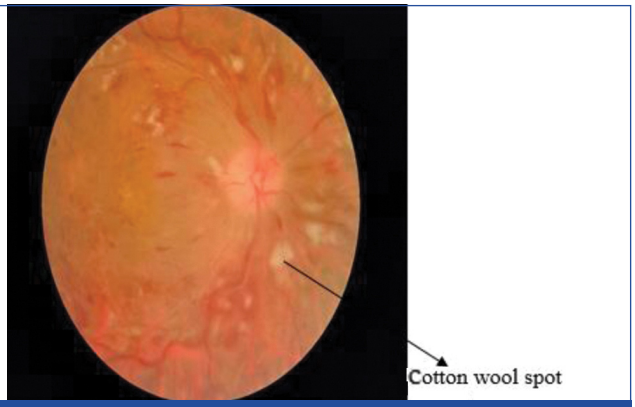
Following the administration of an anti-VEGF injection, there was a noticeable regression of haemorrhages and resolution of optic disc oedema [Table/Fig-11b]. Imaging showed VH, and the patient was advised to undergo observation for three months [Table/Fig-12].

Complications	Number (2)	Percentage
Tractional retinal detachment	01	4.34%
Glaucoma	01	4.34%

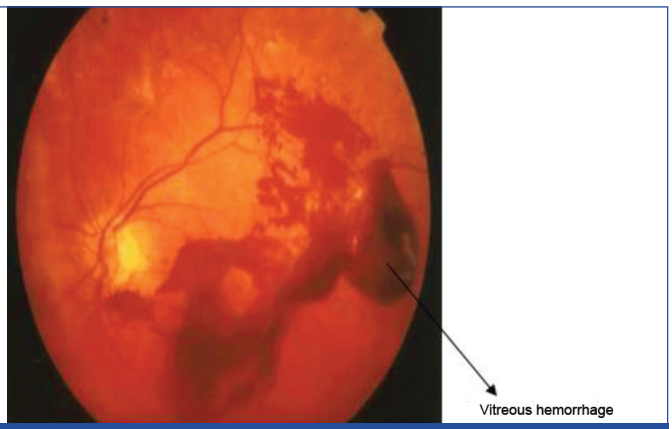
[Table/Fig-10]: Postoperative complications (n=2 eyes).



[Table/Fig-11a]: Shows right eye central retinal vein occlusion.



[Table/Fig-11b]: Shows regression of haemorrhages and optic disc oedema are seen after anti-VEGF injection.



[Table/Fig-12]: Shows left eye Vitreous Haemorrhage (VH).

DISCUSSION

The present study aimed to investigate the aetiology and visual outcomes following the management of VH. A total of 23 eyes from 21 patients were included in the study, with a higher prevalence of males 16 (76.19%) compared to females 5 (23.80%). This result is consistent with the findings of Prakash DN et al., who reported a male prevalence of 74.46% and female prevalence of 25.53%. Similarly, Manadhar D et al., examined 198 patients and noted a male predominance of 72.73% [15,16]. Another study by Desai N et al., also reported a male predominance of 67% among 70 patients [17].

In the present study, the most common age group was 41 to 50 years (42.85%), with the majority of patients being over 40 years old. This finding is consistent with the study by Sharma R et al., which reported an even distribution of VH among older patients aged over 40 years [18]. It is also in agreement with the study conducted by Prakash DN et al., which found that most patients (78.71%) were over 40 years of age. In comparison, 95.22% of patients in the present study were above 40 years of age [15].

In present study, 19 (90.47%) cases presented with unilateral VH, while 2 (9.52%) cases were bilateral. These findings are similar to those from a study conducted by Prakash DN et al., where only one case was bilateral [15]. Similarly, a study by Raghuwanshi S et al., showed unilateral involvement in 94.67% of 75 patients [19].

The most common cause of VH was found to be PDR in 11 (52.38%) cases. This aligns with the study by Desai N et al., which reported that out of 70 patients, 34% had VH due to PDR, and is consistent with the findings of Prakash DN et al., which showed a prevalence of 41.6% for PDR in cases of VH [15,17]. This finding also corresponds with studies conducted by Sharma R et al., Sethi SK et al., and Phogat J et al., [18,20,21].

Following PDR, the other causes of VH included RVO in 5 cases (23.80%), trauma in 4 cases (19.04%), and vasculitis in 1 case (4.76%). These results were similar to several studies, although they differed from others. According to a study by Manadhar D et al., Branch Retinal Vein Occlusion (BRVO) was the most common cause of VH, followed by PDR. In a study by Raghuwanshi S et al., which reviewed 75 patients, vascular disorders were the most common cause (48%), followed by ocular trauma (29.33%) [19].

In a study conducted by Prakash DN et al., out of 47 patients, PDR accounted for 41.6% of cases, followed by retinal vein occlusion (14.5%). Eales disease was reported in 2 (4.16%). In the present study, 1 (4.76%) case of Eales disease was identified, which is similar to Prakash DN findings [15].

The Best-corrected Visual Acuity (BCVA) at the time of presentation was between 1/60 and PL in the majority of cases (12, or 52.17%), similar to a study by Desai N et al., which indicated that most patients (53%) had BCVA <1/60 PL, while only 9% had BCVA better than or equal to 6/60 at presentation [17].

Management included observation, anti-VEGF therapy, and anti-VEGF followed by PRP or PPV. Surgical management was performed in only eight eyes (34.78%). Anti-VEGF therapy was administered in 10 cases (43.47%), while a combination of anti-VEGF followed by PPV was performed in 6 cases (26.08%). In most PDR cases, specifically 6 (46.15%), anti-VEGF was administered followed by observation.

In cases scheduled for PPV, anti-VEGF was given preoperatively to reduce the risk of bleeding and provide a clearer surgical view. This approach was consistent with the findings reported by Xincheng Su et al., [22]. Postoperative visual acuity was assessed at one week, one month and three months post-surgery. Notable improvements in vision were recorded, with 10 (43.47%) cases achieving visual acuity between 6/6 and 6/18. However, 2 (8.69%) cases did not show improvement due to complications such as tractional retinal detachment and glaucoma.

Limitation(s)

The present is a one-year study with a small sample size, which limits the statistical power and generalisability of the findings. Since, the research was conducted at a single hospital, the findings may not be directly applicable to broader populations.

CONCLUSION(S)

According to the aforementioned findings, vitreous haemorrhage most commonly affects males over the age of 40, with Proliferative Diabetic Retinopathy (PDR) emerging as the leading cause. Unilateral

involvement was predominant, and the majority of patients presented with poor initial visual acuity. The use of anti-VEGF therapy, either alone or in combination with PPV or PRP, was effective in managing VH, particularly in cases of PDR. A significant number of patients achieved notable visual improvement over the three-month follow-up period. However, some cases did not show improvement due to complications such as tractional retinal detachment and glaucoma. Timely diagnosis of the underlying aetiology and the selection of an appropriate treatment strategy are essential for achieving favorable visual outcomes.

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