

To Assess Etiologies and Visual Outcomes after Pars Plana Vitrectomy for Vitreous Hemorrhage in Non-Diabetic Patients

Dr Sabiha Farhana Islam¹, Prof Dr Sarwar Alam², Dr Arif Hayat Khan Pathan³, Dr Md Shakhawat Hossain⁴, Dr Salma Noor Dona⁵, Dr Montasim Billah Bikash⁶

Abstract

Purpose: To assess etiologies and visual outcomes after pars plana vitrectomy for vitreous hemorrhage in non-diabetic patients.

Materials and Methods: This is a descriptive cross-sectional study which was conducted at the IIEI&H, Dhaka, Bangladesh for 12 months period following approval of this protocol. Total 30 patients were included in the study who had non-diabetic vitreous hemorrhage. Risk and benefits were discussed to all patients and informed consent was obtained. PPV were performed in all patients with dense or non-resolving vitreous hemorrhage. Patients had follow-up on 1st post operative day (POD), then on 7th POD, then on 1st month, then on 3rd month and finally on 6th month. Visual acuity (VA), intraocular pressure (IOP) and complications were recorded during follow-up.

Results: The mean age of the patients was 43.57±12.67 years. Among them 60% were male, 93% were Muslim and 67% were urban resident. 13.30% of the cases had grade 1, 56.70% had grade 2, 23.30% had grade 3, 6.60% had grade 4 vitreous hemorrhage. Causes of vitreous hemorrhage was found due to trauma (33.30%), retinal vein occlusion (20%), retinal tear (20%), PVD without retinal tear (13.30%), retinal vasculitis (10%) and hypertensive retinopathy (3.30%). 22 (73.30%) patients presented with sudden visual loss which was maximum. Preoperatively, 22 (73.33%) cases had BCVA worse than fingers count (FC) and 08 (26.70%) had BCVA FC. Postoperatively, 06 (20%) had BCVA worse than FC and 24 (80%) had BCVA FC. The mean preoperative IOP was 10.87±3.83mmHg and 01 of them had raised IOP of 28mmHg. At 6th month, only 01 patient had raised IOP of 38mmHg. Some patients were ended up with complications like cataract, macular edema, recurrent hemorrhage etc.

Conclusion: Among the different etiologies of vitreous hemorrhage in this study, trauma and retinal vein occlusion were the most frequent. Following management significant improvement in visual acuity was noted. Few cases were ended up with complications.

Keywords: Visual outcome, Pars Plana Vitrectomy (PPV), Vitreous Hemorrhage, Non-Diabetic Patients.

Introduction

Vitreous hemorrhage is the extravasation of blood from ruptured vessels into the vitreous cavity. In adult, proliferative diabetic retinopathy (31—54%)² is the most common cause. Other causes include, retinal tear, proliferative retinopathy after retinal vein occlusion, posterior vitreous

detachment, hemoglobinopathies, ocular trauma¹⁻³, retinal arterial macro-aneurysms, choroidal neovascularization and intraocular tumors.

Patients with vitreous hemorrhage have impaired visual acuity, the final fate of which are strongly influenced by underlying causes. Traditionally,

1. Senior Medical Officer, Ispahani Islamia Eye Institute & Hospital (IIEI&H), Farmgate, Dhaka

2. Senior consultant, Director Education, IIEI&H, Farmgate, Dhaka.

3. Consultant cum Associate Professor, IIEI&H, Farmgate, Dhaka.

4. Senior Medical Officer, IIEI&H, Farmgate, Dhaka.

5. Senior Medical Officer, IIEI&H, Farmgate, Dhaka.

6. Assistant Surgeon, National Institution of Ophthalmology, Agargaon, Dhaka.

Address of Correspondence: Dr. Sabiha Farhana Islam, Ispahani Islamia Eye Institute & Hospital, E-mail: sabiha081291@gmail.com

PPV is recommended in non-resolving vitreous hemorrhage within 2 to 3 months^{1,4-7}. Moreover, early PPV is recommended in dense vitreous hemorrhage. Recent studies have suggested that early PPV reduces overall retinal detachment rate and results in better visual prognosis^{1,4-6}.

Outcomes after PPV for several nondiabetic vitreous hemorrhage has been complicated with various conditions like iatrogenic retinal tear^{8,9}, intra operative hemorrhage, lens injury, progressive cataract, late retinal detachment, recurrent vitreous hemorrhage⁹. Macular pigmentary changes, optic atrophy, macular edema, epi retinal membrane to be the causes of poor visual outcomes⁸.

Methods

A descriptive cross-sectional study was conducted at the IIEI&H, Dhaka, Bangladesh for 12 months period following approval of protocol. Patients presenting with non-diabetic vitreous hemorrhage were included in the study. The study was done to assess etiologies and visual outcomes after PPV for vitreous hemorrhage in non-diabetic patients. Patients were screened at the slit lamp and separated.

Inclusion criteria

- Age: > 18
- Sex: Both sex
- Diagnosed case of vitreous hemorrhage
- Willing to participate

Exclusion criteria

- Age:<18 years
- Diabetic patient
- Previous vitreoretinal surgery
- Active intraocular inflammation with or without infection
- Dense cataract
- Severely ill patients
- Not willing to participate in the study
- Patients with follow-up of less than 6 months

Informed written consent was obtained from all the patients. Data were collected by using a semi-

structured questionnaire containing socio-demographic parameters and relevant information regarding vitreous hemorrhage including trauma, ocular surgery, diabetes, sickle cell anemia, leukemia, high myopia etc.

Duration from onset of symptoms to referral were noted. Random blood sugar was tested in all patients. All patients underwent a comprehensive ophthalmic examination including visual acuity, applanation tonometry, indirect ophthalmoscopy and B-scan ultrasound to determine the etiology in each patient. Patients were separated in different groups according to severity of vitreous hemorrhage. PPV were performed in dense or non-resolving vitreous hemorrhage.

Postoperatively, patients were examined on the 1st POD, then on 7th POD, thereafter on 1st month, then on 3rd month and finally on 6th month. Visual acuity, IOP and complications were recorded during the follow-up.

Collected data were recorded in separate case record form. Finally, data were sorted out, and inputted into statistical software. After that final analysis was done by SPSS 23. P<0.05 was considered for level of statistically significant.

Result

Total 30 patients of nondiabetic vitreous hemorrhage were enrolled into the study. The mean age was 43.57±12.67 years. Among the study patients 18 (60%) were male. 28 (93%) were Muslim and 02 (7%) were Hindu among the study cases. 20 (67%) among the 30 patients were urban resident.

Out of 30 study subjects maximum 08 (26.70%) were day-laborer, 06 (20%) were housewife, 05 (16.70%) were private employee, 03 (10%) were government employee, 03(10%) were businessman, 03(10%) were student and 02 (6.70%) had other professions.

Considering about the severity of vitreous hemorrhage¹³, 04 (13.30%) cases had grade 1, 17 (56.70%) cases had grade 2, 07 (23.30%) cases had grade 3 and 02 (6.60%) cases had grade 4 vitreous hemorrhage.

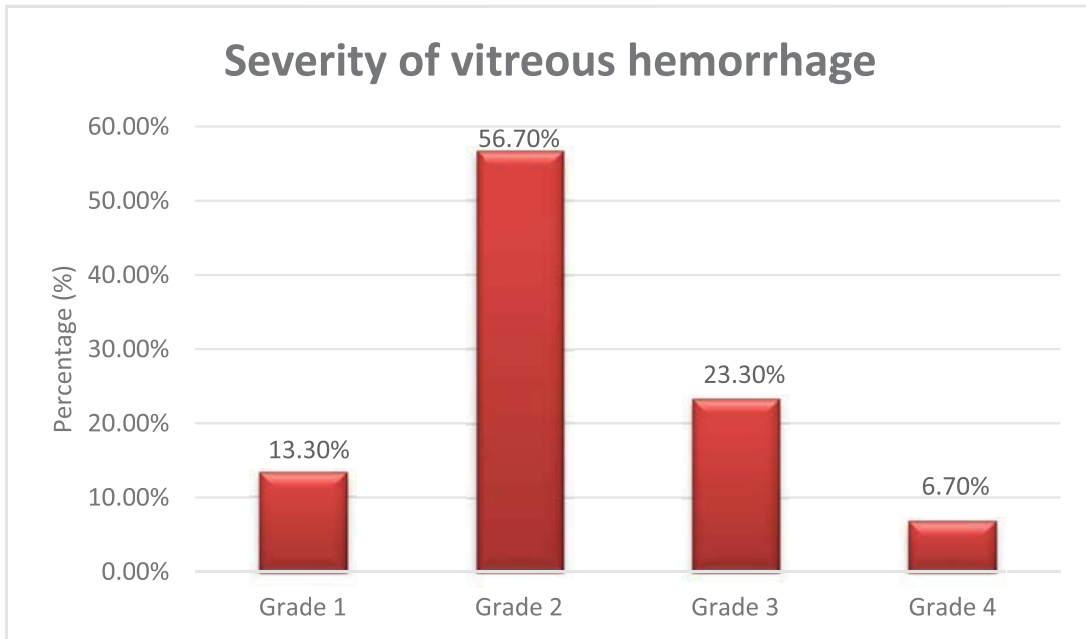


Figure: Severity of vitreous hemorrhage (n=30).

Among 30 study patients 10 (33.30%) had vitreous hemorrhage due to trauma, 06 (20%) had retinal vein occlusion, 06 (20%) had retinal tear, 04 (13.30%) had PVD without retinal tear, 03 (10%) had retinal vasculitis, and 01 (3.30%) had hypertensive retinopathy.

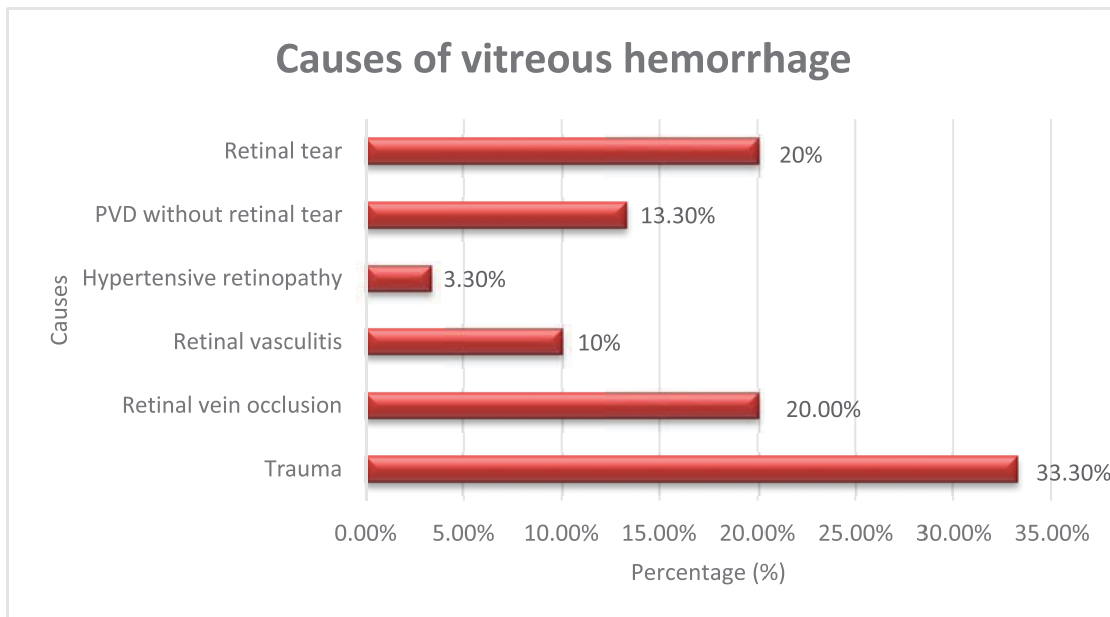


Figure-7: Causes of vitreous hemorrhage among the patients (n=30).

Sudden visual loss was the commonest clinical presentation in 22 (73.30%) cases, slowly progressive visual loss was in 03(10%) cases and unilateral floater was in 05 (16.70%) cases.

Before operation 17 (56.67%) cases had severe vision impairment and BCVA worse than fingers count (FC) and 13 (43.33%) had BCVA FC or better than FC.

Table: Visual acuity of the patients before operation, on 1st POD and on 6th month (n=30) by Snellen chart.

Visual Acuity (VA)	Preoperative VA		VA on 1 st OPD		VA on 6 th month	
	Number of patients	Percentage (%)	Number of patients	Percentage (%)	Number of patients	Percentage (%)
LP	04	13.30	01	3.30	00	00
HM	13	43.30	09	30.30	02	6.70
CF	10	33.30	14	46.70	09	30.00
1/60	00	00	01	3.30	04	13.30
2/60	00	00	01	3.30	02	6.70
3/60	00	00	01	3.30	03	10.00
6/60	01	3.30	03	10.00	02	6.70
6/36	02	6.70	00	00	05	16.70
6/24	00	00	00	00	01	3.30
6/18	00	00	00	00	02	6.70

VA= Visual Acuity, LP= Light Perception, HM= Hand Movement, CF= Counting Finger, POD= Post Operative Day

After operation at 1st POD, 10 (33.33%) patients had VA worse than CF and 20 (66.67%) patients had VA of CF or better. On 6th month, only 02 (6.67%) patients had VA worse than CF. Furthermore, 08 (26.67%) patients obtained VA better than 6/60.

Table: Improvement of visual acuity (VA) of the patients after operation (n=30).

VA	Pre operatively (%)	Post operatively (%)	P value
Log MAR score	2.73±1.11	1.52±0.67	Â0.001

P value is determined by paired sample t test.

Visual acuity improved statistically significantly following operation (p 0.001). Pre-operative mean LogMAR score of the cases was 2.73±1.11 and post-operative mean LogMAR score of the cases

was 1.52±0.67 on 6th month. Pre-operative 01 patient had 06mmHg IOP which was the lowest. 01 patient had 28mmHg IOP which was the highest. The mean IOP before operation was 10.87±3.83mmHg.

Table: Intraocular pressure (IOP) of the patients before operation, on 1st post operative day (POD) and on 6th month.

IOP	Before operation		1 st POD		6 th month	
06	01	3.30	01	3.30	01	3.30
08	05	16.70	00	00	00	00
09	03	10.00	00	00	00	00
10	09	30.00	13	43.30	14	46.70
11	05	16.70	07	23.30	07	23.30
12	03	10.00	03	10.00	03	10.00
13	00	00	01	3.30	00	00
14	02	6.70	03	10.00	03	10.00
16	01	3.30	01	3.30	01	3.30
18	00	00	01	3.30	00	00
28	01	3.30	00	00	00	00
38	00	00	00	00	01	3.30

On 1st POD, 01 patient had lowest recorded IOP 08mmHg. 01 patient had highest recorded IOP= 18mmHg. On 6th month, 01 patient had lowest recorded IOP 08mmHg. 01 patient had highest recorded IOP= 38mmHg.

Table: changes of IOP after operation (n=30)

Variable	Pre operatively (%)	Post operatively (%)	P value
Mean IOP	10.87±3.83	11.97±5.18	Â0.025

P value is determined by paired sample t test.

Mean IOP was improved significantly following operation (p= 0.025). Pre-operative mean IOP was 10.87±3.83mmHg. But on 6th month mean IOP was 11.97±5.18mmHg.

After 6 months of vitrectomy surgery, several complications were noted which are presented in following chart.

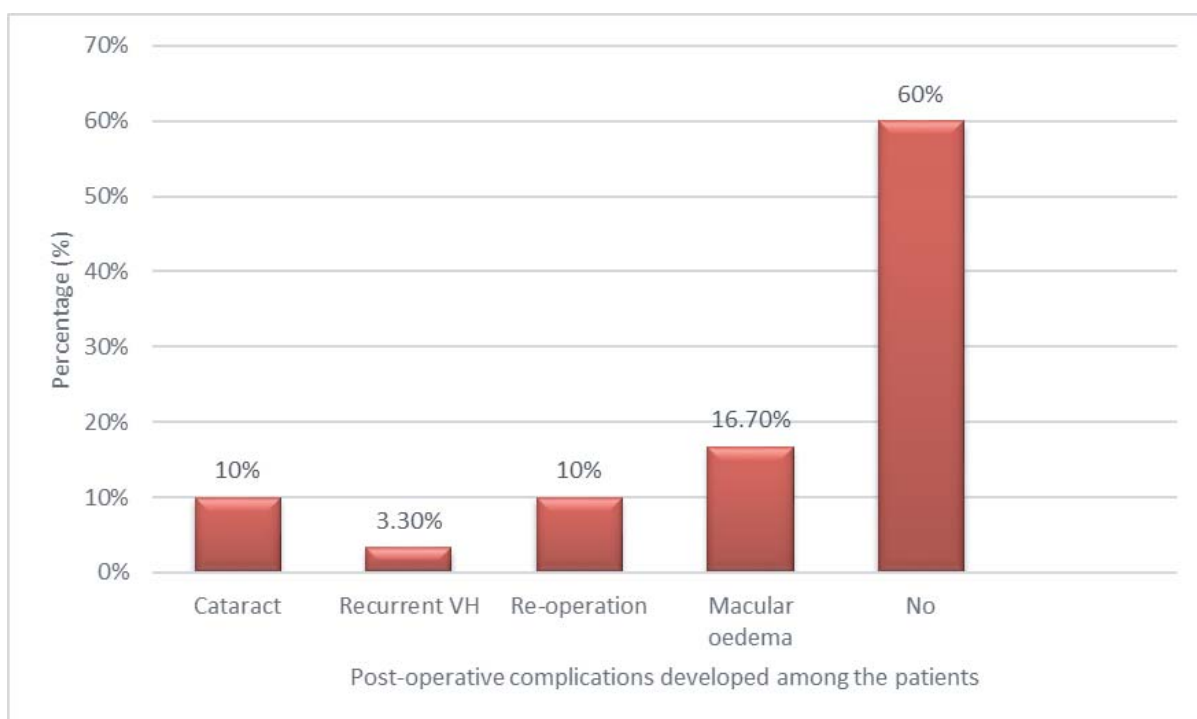


Figure: Complications that was developed among the patients by the end of 6 months.

Discussion

Vitreous hemorrhage is one of the most common causes of sudden visual loss the incidence of which is approximately 7 patients per 100000 population¹⁷. Causes of vitreous hemorrhage includes diabetic retinopathy, trauma, retinal vein occlusion, retinal vasculitis, posterior retinal detachment, retinal tear etc. Pars plana vitrectomy (PPV) is a surgical method for restoring vision of

the affected individual of persistent vitreous hemorrhage.

The main objective of this study is to assess etiologies of vitreous hemorrhage in non-diabetic patients and visual outcomes of pars plana vitrectomy for this condition. The study was conducted in IIEI&H, Dhaka. Total 30 patients of vitreous hemorrhage who fulfilled inclusion and exclusion criteria were included into the study.

This study was a cross sectional type of descriptive study.

The mean age of the cases was 43.57 ± 12.67 years. Among the 30 study cases, 06 (20.00%) patients were in 18-30 years age group, 07(23.30%) were in 31-40 years age group, 09 (30.00%) were in 41-50 years age group, 05 (16.70%) were in 51-60 years age group and 03 (10.00%) were in >60 years age group. This finding is almost similar to the finding of Dana and associates and Shuaib and his colleague^{11,16}. Another study conducted by Wang and co-researchers studied 4379 cases of vitreous hemorrhage in 2001-2010 and found 2418 (55.22%) cases in 40-59 years age group which is nearly consistent to the finding of this study.

Among 30 study cases maximum 18 (60%) were male and 12 (40%) were female. Study conducted by Faisal and co-researchers, Shuiab and co-researcher and Lin and co-researchers also found maximum of their study cases in male gender group^{10,16,18}.

Among the study subjects 67% were urban resident and 33% were rural resident. Maximum 26.70% were day-laborer, 20% were housewife, 16.70% were private employee, 10% were government employee, 10% were businessman, 10% were student and 6.70% had other professions.

According to Goff and associates, Winslow and associate, and Spraul and associate proliferative diabetic retinopathy, trauma, retinal vein occlusion, retinal tear and vitreous detachment were the most common causes of vitreous hemorrhage^{17,19,20}. Our finding is almost similar to the findings of their study. After exclusion of diabetic cases, we found 33.30% of the study cases had vitreous hemorrhage due to trauma, 20% due to retinal vein occlusion, 20% due to retinal tear, 13.30% due to PVD without retinal tear, 10% to retinal vasculitis, and 3.30% due to hypertensive retinopathy.

According to Zhang and associates, Taylor and associates, Saxena and associates, and Cuevas and associated visual impairment is the commonest symptoms of vitreous hemorrhage. Consistent to

their findings this study also reveals similar results. Among the study cases sudden visual loss was present in 22 (73.30%) cases, slowly progressive visual loss was present in 03(10%) cases and unilateral floater was present in 05 (16.70%) cases.

Visual acuity was statistically significantly improved following operation (P 0.011). Mean LogMAR score of the visual acuity of the patients was 2.73 ± 1.11 before operation and 1.52 ± 0.67 on 6th month after operation. Study conducted by Moradian and co-researchers, Zhang and co-researchers, Narayanan and co-researchers, Verbaken and co-researcher and Jiang and co-researchers also observed significant improvement of visual acuity following pars plana vitrectomy operation in their respective study^{8,12,13,14,15}.

Increased IOP is a common complication after PPV which was in study of 'Iwase T and associates' and 'Fang Y and associates'^{21,22}. Considering the previous studies, our study also reveals significant rise of IOP following PPV ($p=0.025$). Before operation the mean IOP was 10.87 ± 3.83 mmHg. But IOP was increased to 11.97 ± 5.18 mmHg by next 6 months following operation.

Among the study cases, 03 (10%) patients had developed cataract, 01 (3.30%) had recurrent vitreous hemorrhage, 03 (10%) had needed re-operation and 05 (16.70%) had developed macular edema following operation. Study conducted by 'Ghartey and associates' also observed post operative cataract among their 6.5% study cases²³. 'Stein and associates' recorded recurrent hemorrhage among their 1.5% cases, macular edema in 7% cases and re-operation needed in 12.50% cases which was nearly consistent to the finding of our study²².

Conclusion

Different etiology was found for vitreous hemorrhage in non-diabetic individuals Among the etiologies trauma and retinal vein occlusion was the most frequent. Following management significant improvement in visual acuity, and BCVA FC happened in subsequent follow up.

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