

■ **Original article**

Etiology of vitreous hemorrhage in a tertiary eye care center in Nepal

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Abstract

Introduction: Vitreous hemorrhage is one of the most common differential diagnoses of sudden painless decrease in vision.

Objective: To find out the etiology of vitreous hemorrhage in cases of vitreous hemorrhage at a tertiary eye centre in Nepal.

Materials and methods: This was a hospital-based cross-sectional study done over a period of one-and-a-half years. One hundred and one subjects with vitreous hemorrhage were evaluated in detail to establish the etiology.

Statistics: The mean value and standard deviation were calculated. The data were analyzed using microsoft excel and SPSS 11.5 program.

Results: A total of 122 eyes of 101 patients were evaluated. The mean age was 41.90 (\pm 21.50) years with a range of 2 months to 84 years. Male were 73 %. Bilateral involvement was found in 20.8 %. Proliferative diabetic retinopathy, retinal vasculitis, branch retinal vein occlusion, rhegmatogenous retinal detachment together with ocular trauma constituted the etiology of vitreous hemorrhage in more than 75 % of patients.

Conclusion: Proliferative diabetic retinopathy, retinal vasculitis and branch retinal vein occlusion are the most common causes of vitreous hemorrhage in adults whereas in children trauma is the commonest cause.

Keywords: vasculitis, vitreous hemorrhage, diabetic retinopathy, Eales disease

Introduction

The vitreous humor is a transparent colorless gel occupying about 80 % (4.0 ml) of the volume of the eyeball (Sebaj J, 1989). Vitreous hemorrhage is defined as the presence of extra-vascular blood within the space outlined by the internal limiting membrane of the retina posteriorly and laterally, the non-

pigmented epithelium of the ciliary body antero-laterally, and the lens zonules and the posterior lens capsule anteriorly (Spraul C et al 1997). Vitreous hemorrhage leads to a sudden appearance of floaters, visual haze, smoke signals, perception of red or more commonly, black shadows and cobwebs. In more dense vitreous hemorrhage there is a sudden loss of vision (Kaykhosrov et al 2003). The causes of spontaneous vitreous hemorrhage can be better understood by four main patho-physiological mechanisms: retinal vascular disorders that cause retinal ischemia, retinal vascular abnormality not

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associated with retinal ischemia, normal retinal vessel rupture and breakthrough of sub-retinal hemorrhage dissecting through the retina without an associated retinal detachment (Saxena S et al 2003). Blunt or penetrating ocular trauma, orbital trauma and systemic trauma may cause a variety of posterior segment abnormalities including vitreous hemorrhage. The vitreous hemorrhage has been highlighted as an important ophthalmological emergency of a serious ocular dysfunction of varying etiology that often has systemic association (Saxena S et al 2003). This study was carried out to find out the etiology of vitreous hemorrhage in Nepal because there is some scarcity of data on this issue from this part of the world.

Materials and methods

A cross-sectional study was conducted among the patients presenting with ocular complaints to the BP Koirala Lion's Center for Ophthalmic Studies (BPKCOS) and Tribhuvan University Teaching Hospital (TUTH) eEmergency in Kathmandu. If vitreous hemorrhage was detected on examination, the patient was considered suitable for enrolment in the study. An informed consent was taken from all the patients. The patients that had already received treatment for vitreous hemorrhage and had been re-evaluated for a regular follow-up were excluded from the study.

The patient characteristics were collected on a predesigned pro forma. After taking a detailed history, ocular examination was done systematically. Blood pressure measurement was done in every patient. The intraocular pressure was measured in all patients with air-puff tonometer and confirmed by applanation tonometry if the readings were higher than 21 mm Hg. Blood sugar estimation was performed in all patients and further tests were done depending upon the need of individual patients according to the age and clinical characteristics of the patient.

Statistics

All data collected were entered into computer software and analyzed according to Microsoft Excel and SPSS 11.5 program.

Results

A total of 122 eyes of 101 patients found to have vitreous hemorrhage were evaluated. The mean age

was 41.90 (\pm 21.50) years with a range of 2 months to 84 years. The younger patients were mostly affected in age groups of 20-30 years (22.8 %) whereas older patients were almost evenly distributed in the age groups of > 40 years. Most of the patients were male (73 %). Male preponderance was seen in the age group of 10-40 years. The disease was bilateral in 20.8 % of patients.

Presenting complaints were of sudden (38.2 %) or slowly progressive loss of vision (23.2 %), and floaters (22.8 %). A history of low birth weight and preterm delivery was also obtained in 1 % of the patients. Systemic complaints were obtained in a minority of patients at the time of presentation. Ten percent of the patients presented with a headache and 1% had fever at presentation. The rest of the patients had no systemic symptoms. Systemic illnesses were found in a significant number of patients (42 %), the most common ones being diabetes (20 %), hypertension (16 %) and both (4 %). 21 % of the patients gave a history of alcohol consumption and 27 % of them were smokers.

The mean duration of symptoms at presentation was 113.41 days (\pm 38.45 days), and the range less than 24 hours to 10 years. 31.7 % of the patients presented within 7 days of the onset of symptoms and 5.9 % of the patients within 24 hours of onset. Symptoms had already been present for more than a month in 30.7% of patients prior to presentation to the hospital. One patient presented as long as 10 years after the onset of symptoms.

The mean systolic blood pressure was 123 \pm 24.892 mm Hg (range 80-200 mm Hg) and mean diastolic blood pressure was 78 \pm 11.12 mm Hg (range 60-120). According to the commonly used criteria to define hypertension (SBP >140 and DBP > 90 mmHg), 22 % of patients had systolic blood pressure more than 140 mm Hg and 9 % had diastolic blood pressure more than 90 mm Hg. Among all the patients with high blood pressure by those standards, the mean systolic blood pressure was 162 \pm 13.51 (range 150- 200) mm Hg and the mean diastolic blood pressure was 101 \pm 6.9 (range 98-120) mm Hg.



The mean random blood sugar was 122.37 ± 48.32 mg/dl (Range=70-340 mg/dl). When different groups of patients were compared for their random blood sugar based on the etiology of vitreous hemorrhage, there was no statistical difference between random blood sugar of patients with proliferative diabetic retinopathy (181.4 mg/dl), branch retinal vein occlusion (107.09 mg/dl) and retinal vasculitis (104.8 mg/dl) (ANOVA, $p=0.908$).

Etiology of vitreous hemorrhage		
Diagnosis	Number of eyes of patients	Percentage of patients
Proliferative diabetic retinopathy	36	30.33%
Retinal vasculitis (Eales' disease)	25	20.32%
Branch retinal vein occlusion	13	9.66%
Closed globe injury	10	8.20%
Rhegmatogenous retinal detachment	8	6.60%
Age related macular degeneration	5	4.10%
Open globe injury	5	4.10%
Posterior vitreous detachment	3	2.45%
Tractional retinal detachment	3	2.45%
Central retinal vein occlusion	2	1.64%
Complications of laser in diabetic retinopathy	2	1.64%
Serpiginous choroiditis	2	1.64%
Terson's syndrome	2	1.64%
Acute lymphoblastic leukemia	1	0.81%
Posterior uveitis	1	0.81%
Retinopathy of prematurity	2	1.64%
Not known	2	1.64%
Total	122	100.00%

The patients had a variable degree of visual impairment at presentation. Many eyes (59 %) were clinically blind at the time of presentation. A significant number of the others were visually impaired (17.2 %) or severely visually impaired (3.3 %). In 4.1 % of the eyes, there was no perception of light. About 16.4 % of eyes had normal or near normal vision at the time of presentation.

Discussion

This study was conducted with the objective of determining the common causes of vitreous hemorrhage in patients attending BPKLCS and TUTH. Younger patients were mostly affected in age group of 20-30 years (22.8 %) whereas older patients were almost evenly distributed in the age groups of > 40 years. Like ours (73 %), Lean JS et al (1980) reported a slightly higher population (55 %) of male patients in their analysis of one hundred consecutive cases of vitreous hemorrhage. A slightly higher prevalence of any vitreo-retinal disorder was reported in favour of males (11.8 % vs 10.2 %) in the Aravind Comprehensive Eye Study (Nirmalan P K et al 2004) in a population-based prevalence study of vision and other eye diseases in a rural population of 40 years and older in South India. There was no significant difference in the age-adjusted prevalence of vitreo-retinal disorders between sexes. A very high male predominance of vitreous hemorrhage in our study is probably related to a high prevalence of Eales' disease in this series. Nagpal PN et al (1998) and Thompson JT et al (1987) have highlighted that Eales' disease most commonly affects healthy young male adults (up to 97.6 %). However, Wahab S et al (2008) also reported a slight male predominance (66.9 %) in their analysis of patients with diabetic retinopathy.

The majority of patients (79 %) had unilateral vitreous hemorrhage. Spirn MJ et al (2006) also reported unilateral involvement in 90.5 % of all eyes in an evaluation of vitreous hemorrhage in children. Similarly, Yeung L et al (2008) analyzed 32 patients with closed globe injury and severe vitreous hemorrhage of which 99 % had unilateral disease. The involvement of the right eye more than the left is not explained in literature and we do not have an adequate explanation for the same in the present study.

The mean age of presentation of common diseases in our study was variable. Wahab S et al (2008) reported the mean age of 54.7 ± 12 years for diabetic retinopathy. Gadkari SS et al (1992) reported the mean age of patients with Eales' disease as 20 to 30 years. Trauma contributed 12.29 % of vitreous hemorrhage in our study. Spirn M J et al (1997) reported trauma as a common cause for vitreous hemorrhage in children.

Most patients in our study presented with sudden (38.2 %) or slowly progressive loss of vision (23.2 %), floaters (22.8 %) and photopsia (4 %). Lean J et al (1980), however, reported that a higher percentage (66 %) of patients complained of floaters only, or floaters with photopsia (15 %). They also reported that 19 % presented only with blurring of vision, 11 % of patients had had a previous episode of vitreous hemorrhage and 12 % gave a history of ocular trauma immediately preceding the onset of their symptoms. Only 5.9 % of patients presented within 24 hours of the symptom onset and 30.7 % had symptoms for more than a month at presentation. This could represent a referral centre bias as the patients with prolonged duration of illness were mainly referred. One patient presented as long as 10 years after the onset of symptoms as he was unaware of his vision decrement. Spirn M J et al (2006) reported slightly different features in childhood vitreous hemorrhage. Decreased vision (72.5 %) was the most frequent complaint and less common presentations included strabismus (12.5 %), abnormal pupillary reflex (10.0 %), pain (10.0 %), behavioral change (8.8 %), nystagmus (7.5 %) and floaters (6.3 %).

Systemic symptoms were not commonly seen in the present study. Ten percent of the patients presented with headache and 1 % had fever at presentation. The headache was secondary to raised intraocular pressure (8 %) and associated migraine (2 %) in those patients. Biswas J et al (1995) reported three patients with Eales' disease with neurological manifestations, among which two of them had migrainous headaches. 40% of the patients had associated systemic illness. They were diabetics (20 %), hypertensives (16 %) and both (4 %). Although only 16 % of the patients had known hypertension, 22 % of them had systolic blood pressure above the

reference norms. Most of these patients had presented for the first time with ocular symptoms and still had their medical evaluation pending. Lean J (1980) reported hypertension in 5 % and diabetes in 6 % of patients presenting with vitreous hemorrhage. The higher prevalence of these medical problems in the current study is probably reflective of a higher population prevalence of these conditions and late presentation with absence of screening of retinopathy in these medical conditions. Dana et al (1993) reported that proliferative diabetic retinopathy accounts for 64 % of vitreous hemorrhage in patients with type II diabetes and 89 % of vitreous hemorrhage in patients with type I diabetes. Etiologies of vitreous hemorrhage in the present study were variable. The results of this study showed some similarities and some important differences to other studies. Proliferative diabetic retinopathy (30.33 %), retinal vasculitis (20.32 %), globe injuries (12.30 %), branch retinal vein occlusion (9.66 %), rhegmatogenous retinal detachment (6.60 %), age-related macular degeneration (4.10 %) were among the most common diagnoses in our study. Butner and McPherson (1982) also reported in their study that the four most common causes of spontaneous vitreous hemorrhage were diabetic retinopathy (34.1 %), retinal break without retinal detachment (22.4 %), rhegmatogenous retinal detachment (14.9 %), and retinal vein occlusion (13.0 %). Dana MR et al (1993) in their analysis found proliferative diabetic retinopathy (35.2 %), and trauma (18.3 %), retinal vein occlusion (7.4 %) retinal tear without a detachment (7.0 %) to be the most common causes. Lean and Gregor (1980) had a slightly different results in their study of all causes of vitreous hemorrhage and showed retinal tears (40 %), trauma (12 %), retinal vein occlusion (10 %), diabetes (6 %), retinal detachment (4 %), retinoschisis (4 %), hypertension (4 %) and posterior vitreous detachment (3 %) as the most common causes. Morse et al (1974) studied documented proliferative diabetic retinopathy (54 %), retinal tear (27 %) and vitreous detachment (7.5 %) as the most common causes of spontaneous vitreous hemorrhage. Winslow RL and Taylor BC (1980) analyzed spontaneous vitreous hemorrhage and found proliferative diabetic retinopathy (39.2 %), retinal tear (12.1 %), posterior vitreous detachment (12 %) and vein occlusion (10.4 %) as the most common causes.

Dana et al (1993) and Lean J (1980) reported that the patients presenting with vitreous hemorrhage had sustained ocular trauma in 12.3% and 18% respectively. BRVO contributed 10.66% in the present study which was similar to that reported by Lean JS et al (1980), Winslow & Taylor (1980) Dana et al (1983) and Butner & McPherson (1982). In contrast to other studies however, we found retinal vasculitis (Eales' disease) as the second most common cause (20.32%) of vitreous hemorrhage. Abraham C et al (1977) and Das T et al (1994) reported male predominance (up to 97.6%) in a majority of the series. Gadkari SS et al (1992) reported the predominant age of onset of symptoms as between 20 and 30 years. Das T et al (1994) highlighted the disease to be very common in the Indian sub-continent. Although many other causes of retinal vasculitis also cause vitreous hemorrhage, no other cause of retinal vasculitis was identified in the present study. Retinal vasculitis accounted for about 3% of all causes of vitreous hemorrhage in other studies. The observed difference in the prevalence of retinal vasculitis in our study is probably reflective of the epidemiological differences of Eales' disease in our population.

Rhegmatogeneous retinal detachment was seen in 6.6% of patients in our series. This is lower than the incidence of retinal tear reported by Lean JS et al (40%) in 1980, Morse et al (27%) in 1974 and Winslow R et al (12%) in 1980. Posterior vitreous detachment was more common in other studies but only represented 2.45% in our result.

We found 2.45% (3 eyes) of cases of tractional retinal detachment causing vitreous hemorrhage. One eye had the complication of Eales' disease and two eyes had proliferative diabetic retinopathy. We also found that 4.10% had vitreous hemorrhage due to choroidal new vessels in ARMD. Diedler JL et al (1989) reported that vitreous hemorrhage in patients with ARMD had a poor outcome. Among the less common causes, we found acute lymphoblastic leukemia, posterior uveitis, Tersons syndrome, serpiginous choroiditis and complication of laser therapy in diabetic retinopathy. These entities are reported as uncommon causes of vitreous hemorrhage in the literature.

Conclusion

The commonest age of presentation of vitreous hemorrhage is 20-30 years with male preponderance. Unilateral involvement is more common than bilateral. Sudden or slowly progressive loss of vision and floaters are the most common presenting symptoms. Diabetes and hypertension are the most commonly associated systemic illnesses. The most common etiology of vitreous hemorrhage is proliferative diabetic retinopathy followed by retinal vasculitis (Eales' disease) and branch retinal vein occlusion.

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