IBOM MEDICAL JOURNAL
Vol.14 No.1 January, 2021. Pages 46 - 52
www.ibommedicaljournal.org

Causes of vitreous haemorrhage in a tertiary hospital in southern Nigeria

Osayem J. Otabor-Olubor[1], Odarosa M. Uhumwangho[2]

[1,2]*Department of Ophthalmology, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria*

Abstract

Background: The presence of blood within the vitreous is called vitreous hemorrhage. This condition often obscures proper visualization of the posterior segment. Thus, the etiology may not be easily ascertained from clinical assessment. However, it is necessary to know the underlying etiology of this condition in order to institute appropriate management plans.
Aim: To determine the causes of vitreous hemorrhage in a tertiary hospital in Southern Nigeria.
Materials and Methods: A retrospective hospital-based analysis of the medical records of patients with vitreous hemorrhage from January 2011 to December 2015 was performed. Data reviewed included age, sex, duration of symptoms, visual acuity, investigations and cause of vitreous hemorrhage. Data were analyzed using the International Business Machines Statistical Product for Scientific Solutions (IBM SPSS) version 21.
Results: A total of 37 eyes of 37 patients had a diagnosis of vitreous hemorrhage made up of 27(73%) males and 10(27%) females with a male/female ratio of 1: 0.37 and a mean age of 46.3± 18.4 years (range 11 to 80 years). The presenting visual acuity ranged from 6/9 to No Light perception. The two most common causes of vitreous hemorrhage were proliferative retinopathies in 11(29.7%) and trauma 11(29.7%). Diabetic retinopathy was the predominant cause in the proliferative retinopathy 8(21.6%) group. The mean duration of symptoms was 8.7± 7.8days (range 1 to 28 days). The most common investigation requested was B-scan ultrasonography in 19(51.4%) patients.
Conclusion: The most common causes of vitreous hemorrhage in this environment are largely preventable with better management of systemic medical and ophthalmic conditions. Early presentation, regular screening with prompt intervention when treatment is indicated would lead to better outcome.

Key words: Vitreous hemorrhage, Proliferative retinopathies, Trauma, Visual loss

Introduction

The vitreous cavity is a gel-filled space lined posteriorly and laterally by the internal limiting membrane of the retina, antero-laterally by the non-pigmented epithelium of the ciliary body, and anteriorly by the lens zonules and the posterior lens capsule.[1] The presence of blood within the vitreous is called vitreous hemorrhage.[1] Bleeding into the vitreous cavity could occur from fragile new vessels in conditions that cause retinal neovascularization, and from rupture of normal retinal vessels as seen in retinal tears and trauma.[1-3] Spontaneous vitreous hemorrhage typically presents as unilateral sudden painless deterioration of vision, often obscuring the cause of the haemorrhage thereby making diagnosis of the cause difficult.[1-3] However, studies have shown that causes of vitreous hemorrhage are mostly from lesions of the posterior segment of the eye, trauma to the eye and head.[4-14] It is necessary to know the underlying etiology of this condition in order to institute appropriate management plans. This study seeks to determine the common causes and the age and sex distribution of vitreous hemorrhage in a tertiary centre in Southern Nigeria.

Corresponding Author: Dr Osayem J. Otabor-Olubor

Consultant Ophthalmologist, Department of Ophthalmology, University of Benin Teaching Hospital, Benin City, Edo State, Nigeria.
E-mail: drosayem@yahoo.com, Phone: +2348034904123

Materials and methods

This was a retrospective hospital-based analysis of the medical records of patients with vitreous hemorrhage seen at the outpatient eye clinic of the University of Benin Teaching Hospital, Benin City, Nigeria from January 2011 to December 2015. Diagnosis of vitreous hemorrhage was made by the consultant vitreo-retinal surgeon based on a history of poor vision and the presence of hemorrhage in the vitreous cavity as seen with dilated fundoscopy using a slit-lamp with +78D/+90D and/or a binocular indirect ophthalmoscope and/or B-scan ultrasonography. Data was obtained from the clinical documentations in the folders of the patients. The folders were retrieved using their hospital numbers as documented in the register of new patients within the given period. Data reviewed included age, sex, duration of symptoms, visual acuity, investigations obtained and the etiology of vitreous hemorrhage. Ethical clearance for the study was obtained from Ethics and Research Committee of the University of Benin Teaching Hospital. Data obtained were analyzed using the International Business Machines Statistical Product for Scientific Solutions (IBM SPSS) version 21. Descriptive statistics including mean and standard deviation were calculated and analyzed.

Results

A total number of 37 eyes of 37 patients were diagnosed of vitreous hemorrhage during the study period. They were all unilateral cases, and made up of 27(73%) males and 10(17%) females. The mean age was 46.3± 18.4 years (range 11 to 80 years). This is presented in Table 1. Table 2 shows the presenting visual acuity of the patients. This ranged from 6/9 to No Light perception (NLP). NLP was found in 2(5.4%) patients who had vitreous hemorrhage following trauma. The causes of vitreous hemorrhage are presented in Table 3. The most common cause of vitreous hemorrhage was proliferative retinopathies in 11(29.7%) patients. These included diabetic retinopathy 8(21.2%), proliferative sickle cell retinopathy 2(5.4%) and Eales disease 1(2.7%). This was followed by trauma in 11(29.7%) patients. The duration of symptoms ranged from 1 day to 28 days, with a mean duration of 8.7± 7.8days. The most common investigation requested was B-scan ultrasonography in 19(51.4%) patients. Others were laboratory investigations which were full blood count 15(40.5%) and fasting blood sugar 12(32.4%).

Table 1: Age and Sex Distribution of Patients with Vitreous Hemorrhage

Age group in years	Sex		Total (%)
	Male (%)	Female (%)	
11-20	3(8.1)	1(2.7)	4(10.8)
21-30	6(16.2)	0(0.0)	6(16.2)
31-40	5(13.5)	1(2.7)	6(16.2)
41-50	3(8.1)	2(5.4)	5(13.5)
51-60	4(10.8)	2(5.4)	6(16.2)
61-70	3(8.1)	3(8.1)	6(16.2)
>70	3(8.1)	1(2.7)	4(10.8)
Total	**27(73.0)**	**10(27.0)**	**37(100.0)`**

Table 2: Visual acuity of eyes with vitreous hemorrhage

Presenting Visual Acuity	Frequency	Percent
No Light Perception	2	5.4
< 6/60 – Light Perception	20	54.1
6/18 - = 6/60	14	37.8
> 6/18	1	2.7
Total	**37**	**100.0**

Table 3: Causes of Vitreous hemorrhage

Cause	Male: Female	Frequency	Percent
Proliferative Retinopathies	8:3	11	29.7
☐ Proliferative Diabetic Retinopathy	5:3	8	(21.6)
☐ Proliferative Sickle Cell retinopathy	2:0	2	(5.4)
☐ Eales Disease	1:0	1	(2.7)
Trauma	8:3	11	29.7
Retinal Vein Occlusion	1:2	3	8.1
IPCV/AMD	2:1	3	8.1
Retinal breaks/ RRD	3:0	3	8.1
Terson syndrome	0:1	1	2.7
Unknown	4:1	5	13.5
Total	**26:11**	**37**	**100.0**

*IPCV/AMD= Idiopathic polypoidal choroidal vasculopathy/ age related macular degeneration
*RRD= Rhegmatogenous retinal detachment

Proliferative sickle cell retinopathy occurred in known cases of HbSC genotype. Thus, they did not require repeat electrophoresis testing. The case of Eales disease was in a 35-year-old man of Asian descent who previously had vitrectomy twice for recurrent vitreous hemorrhage prior to presentation.

Discussion

Vitreous hemorrhage was found more commonly in males, with a male to female ratio of 1: 0.37. Males generally undertake more outdoor activities and risk-taking behaviors, and are thus more exposed to traumatic eye injuries that could cause vitreous hemorrhage as seen in this study. Of the 11 patients with traumatic vitreous hemorrhage, 8 (72.7%) of them were males. This was in keeping with a study by Oluyemi et al in Ibadan, Nigeria where 80% of the patients with traumatic eye injury were males.[15] A cross-sectional descriptive study on patients hospitalized for ocular trauma in Kashan, China also showed that 79.3% of them were males.[16] Similar studies from the United States[17] and from Australia[18] also showed a higher male preponderance to traumatic eye injuries. Apart from traumatic vitreous hemorrhage, there was also an overall male preponderance in this study (70.3%). This may be due to men being more financially empowered than women (as seen in this part of the world) and thus more capable of assessing health delivery services.

In our study, vitreous hemorrhage did not show any age group predilection. This is so as the etiology of vitreous hemorrhage spanned across different factors: trauma, retinal breaks, medical conditions, etc. These are conditions that relate to different age groups. Thus, all age groups appear well represented in this study. The mean duration of symptoms was 8.7± 7.8 days Patients with acute causes of vitreous hemorrhage such as trauma and rhegmatogenous retinal detachment presented earlier for treatment. There was no case of vitreous hemorrhage found in pre-teenage children.

Diabetic retinopathy is currently one of the major causes of avoidable blindness in the world and among the diseases highlighted in the VISION 2020 Right to Sight initiative.[19,20] Proliferative diabetic retinopathy was the leading cause of proliferative retinopathy as a cause of vitreous hemorrhage in this study responsible for 21.6% of cases. The patients with proliferative diabetic retinopathy in this study were aged 58 – 80 years. Proliferative diabetic retinopathy being the commonest cause of vitreous hemorrhage was also seen in similar studies by Spraul et al1 and Lindgren et al.[21]

In the advanced stages of proliferative sickle cell retinopathy there is neovascularization and fibrous proliferation of the retina, which could cause bleeding into the vitreous and retina.[22] Proliferative sickle cell retinopathy accounted for 5.4% of the patients with vitreous hemorrhage in this study. Vitreous hemorrhage was also found to be of diverse etiology in other studies in Nigeria by Rotimi-Samuel et al[9] in South-West Nigeria and Babalola et al[23] in Northern Nigeria. However, Rotimi-Samuel et al[9] found a significantly greater proportion of cases with proliferative sickle cell retinopathy when compared to this present study. This is likely due to the fact that South¬-West Nigeria has the highest prevalence of patients with sickle cell disease in the country.[24] Furthermore, HbSC rather than HbSS is the more common type of sickle cell disease found in South West Nigeria.[25] Ocular complications of sickle cell disease like the proliferative disease leading to vitreous hemorrhage occur more commonly in the HbSC genotype than the HbSS genotype. Regular annual eye examination of patients above 15 years with sickle cell disease has been advocated.[25]

Retinal vein occlusions (RVO) can cause vitreous hemorrhage from rupture of congested retinal veins and the abnormal proliferation of new vessels formed in response to ischemia of the retina.[8,26] In this study, RVO was responsible for vitreous hemorrhage in 8.1% patients. This was in keeping with a similar study by Dana et al[27] where 7.4% of vitreous hemorrhage was as a result of RVO. All patients were elderly, in keeping with previous studies that RVO occur more commonly in the older age group.[11,28,29] Systemic risk factors include cardiovascular disease, diabetes mellitus, hypertension, hyper-viscosity states, renal disease, connective tissue disease and collagen vascular disease. Ocular risk factors of RVO include glaucoma and hypermetropia.[11,21,22]

Eales' disease, a type of obliterative vasculopathy of the retina due to idiopathic inflammation of the

retinal veins with subsequent neovascularization and hemorrhage,[7] was the cause of vitreous hemorrhage in 2.7% cases. The patient was a 35-year-old male of Asian descent who had previously had vitrectomy twice for recurrent vitreous hemorrhage prior to presentation. As reported, in other studies,[7,30] Eales' disease is commoner in young males than in females. Previous exposure to tuberculosis has been postulated as one of the causes. Treatment for vitreous hemorrhage due to Eales' disease include vitrectomy and use of intra-vitreal anti-VEGF.[30,31]

Trauma was the second leading cause of vitreous hemorrhage after proliferative retinopathies in 29.7%. All the cases were fist injuries from assault. Blunt trauma to the front of the eye causes an acute reduction of the antero-posterior diameter and sudden stretching of the width of the eye, with resultant shearing of retinal vessels, leading to vitreous hemorrhage.[32,33] These occurred from fist injuries in assault with intact external coats of the eye. Vitreous hemorrhage is a common posterior segment finding in ocular trauma.[13,34,35] There is need for better methods of conflict resolution to prevent avoidable visual loss from trauma. The patients with vitreous hemorrhage from trauma in this study were aged 11 – 65 years.

Presumed idiopathic polypoidal choroidal vasculopathy (IPCV) and presumed neovascular age-related macular degeneration (nAMD) accounted for 8.1% of the cases of vitreous hemorrhage in this study. These diagnoses were made clinically without the aid of an optical coherence tomography, as this facility was not available at the time of this study. These conditions are known to cause abnormal new vessels to break through the retina, with subsequent bleeding into the vitreous.[36-38] Treatment includes the use of various types of intravitreal-anti vascular endothelial growth factors and photodynamic therapy with verteporphin used more commonly in the management of IPCV.[38-40]

Retinal tears, with or without rhegmatogenous retinal detachment (RRD) are known causes of vitreous hemorrhage.[1-3] Larger retinal breaks/tears are more likely to cause vitreous hemorrhage than smaller breaks/tears, and they do so when retinal vessels are avulsed with the break/tear.[41] In this study, 8.1% of patients had vitreous hemorrhage with retinal detachment, similar to reports from other studies[1-3] on causes of vitreous hemorrhage. Ocular ultrasound is useful in the detection of large tears and retinal detachment in the presence of vitreous hemorrhage in which the media is obscured; thus, a very important investigative modality. In posterior vitreous detachment, the vitreous gel shrinks to exert a pull on the retina or the retinal blood vessels. This pull could lead to avulsion of the retinal vessels, thereby leading to vitreous hemorrhage.[42]

Terson syndrome, which is intraocular hemorrhage associated with intracerebral hemorrhage, subarachnoid hemorrhage or traumatic brain injury,[14] was the cause of vitreous hemorrhage in 2.7% of patients in this study. It is postulated to occur from rupture of retinal veins due to pressure from optic nerve head swelling from sipped-in cerebrospinal fluid consequent of an acute rise of intracranial pressure.[40] The patient in this study was co-managed by haematologist, neurosurgeon and ophthalmologist. The patient had idiopathic thrombocytopenic purpura and Cranial CT-scan revealed subarachnoid hemorrhage. Terson syndrome is a known cause of vitreous hemorrhage.[14,43-46]

Conclusion and Recommendations

The most common cause of vitreous hemorrhage in this environment is proliferative retinopathies which could have been prevented with better management of systemic medical and ophthalmic conditions with regular screening and prompt intervention when treatment is indicated. Trauma causing vitreous hemorrhage can be treated or prevented with early presentation and better lifestyle choices and conflict resolution in cases of trauma which were mostly from assaults rather than accidents. This knowledge of the causes of vitreous hemorrhage in this environment would be very useful in instituting and implementing appropriate management and prevention strategies. This is relevant vitrectomy, which could be required for treating vitreous hemorrhage, is an expensive procedure. The current minimum wage in Nigeria today is well below the average cost of vitrectomy. Again, uptake of health insurance is low among the populace with the predominant mode of accessing health care being out of pocket payment.

References:

1. Spraul CW, Grossniklaus HE. Vitreous Hemorrhage. Surv Ophthalmol 1997;42(1):3-39.
2. Tan HS, Mura M, Bijl HM. Early vitrectomy for vitreous hemorrhage associated with retinal tears. Am J Ophthalmol 2010;150(4):529-533.
3. Zhang T, Zhang J, Sun X, Tian J, Shi W, Yuan G. Early vitrectomy for dense vitreous hemorrhage in adults with non-traumatic and non-diabetic retinopathy. J Int Med Res 2017 01:300060517708942.
4. Balakrishnan D, Mukundaprasad V, Jalali S, Pappuru RR. A Comparative Study on Surgical Outcomes of Glued Intraocular Lens and Sutured Scleral Fixated Intraocular Lens Implantation. Semin Ophthalmol 2017;11:1-5.
5. Oluleye T, Babalola Y. Pattern of presentation of idiopathic polypoidal choroidal vasculopathy in Ibadan, Sub-Saharan Africa. Clin Ophthalmol 2013;7:1373-1376.
6. Evans JR, Michelessi M, Virgili G. Laser photocoagulation for proliferative diabetic retinopathy. Cochrane Database Syst Rev 2014 Nov 24;(11):CD011234. doi(11):CD011234.
7. Das T, Pathengay A, Hussain N, Biswas J. Eales' disease: diagnosis and management. Eye (Lond) 2010;24(3):472-482.
8. Manuchehri K, Kirkby G. Vitreous haemorrhage in elderly patients: management and prevention. Drugs Aging 2003;20(9):655-661.
9. Rotimi-Samuel A, Aribaba OT, Odeyemi MG, Sonuga AT, Mbadugha CA, Ilo OT, et al. Aetiology of vitreous haemorrhage in Guinness Eye Centre, Lagos University Teaching Hospital over a two year period (June 2007-May 2009). Nig Q J Hosp Med 2010;20(4):162-164.
10. Uhumwangho OM, Itina EI. Retinal Diseases in a Tertiary Hospital in Southern Nigeria. J West Afr Coll Surg 2015;5(2):1-16.
11. Uhumwangho OM, Oronsaye D. Retinal Vein Occlusion in Benin City, Nigeria. Niger J Surg 2016;22(1):17-20.
12. Almendarez JE, Vargas DM, Gonzalez C, Takane M, Koga W. Ultrasound findings in ocular trauma. Arch Soc Esp Oftalmol 2015;90(12):572-577.
13. Williams DF, Mieler WF, Williams GA. Posterior segment manifestations of ocular trauma. Retina 1990;10 Suppl 1:S35-44.
14. Hassan A, Lanzino G, Wijdicks EF, Rabinstein AA, Flemming KD. Terson's syndrome. Neurocritical care. 2011 Dec 1;15(3):554-8.
15. Oluyemi F. Epidemiology of penetrating eye injury in Ibadan: a 10-year hospital-based review. Middle East Afr J Ophthalmol. 2011;18:159–163
16. Shaeri M, Moravveji, Fazel MR and Jeddi FR. Status of ocular trauma in hospitalized patients in Kashan, 2011: As a sample of industrial city. China J Traumatol. 2016; 19(6): 326–329.
17. Haring R.S., Canner J.K., Haider A.H. Ocular injury in the United States: emergency department visits from 2006–2011. Injury. 2016;47:104–108
18. Northey L.C., Bhardwaj G., Curran S. Eye trauma epidemiology in regional Australia. Ophthalmic Epidemiol. 2014;21:237–246.
19. Ting DS, Cheung GC, Wong TY. Diabetic retinopathy: global prevalence, major risk factors, screening practices and public health challenges: a review. Clin Exp Ophthalmol 2016;44(4):260-277.
20. Resnikoff S, Kocur I, Etya'ale DE, Ukety TO. Vision 2020 - the right to sight. Ann Trop Med Parasitol 2008;102 Suppl 1:3-5.
21. Lindgren G, Lindblom B. Causes of vitreous hemorrhage [review]. Curr Opin Ophthalmol 1996; 7(3): 13–9
22. Goldberg MF. Natural history of untreated proliferative sickle retinopathy. Arch Ophthalmol 1971;85(4):428-437.
23. Babalola OE, Wambebe CO. Ocular morbidity from sickle cell disease in a Nigerian cohort. Niger Postgrad Med J 2005;12(4):241-244.
24. Olatunya OS, Ogundare EO, Fadare JO, Oluwayemi IO, Agaja OT, Adeyefa BS, Aderiye O. The financial burden of sickle cell disease on households in Ekiti, Southwest Nigeria. ClinicoEconomics and outcomes research: CEOR. 2015;7:545
25. Akinyanju OO. A profile of sickle cell disease in Nigeria. Annals of the New York Academy of Sciences. 1989 Jan 1;565:126-36.
26. Apostolopoulos M, Koutsandrea C, Chatjoulis D, Ladas J, Theodossiadis G. Late

complications in branch retinal vein occlusion. Int Ophthalmol 1995 -1996;19(5):281-285.
27. Dana MR, Werner MS, Viana MA, Shapiro MJ. Spontaneous and traumatic vitreous hemorrhage. Ophthalmology. 1993 Sep 1;100(9):1377-83.
28. Hayreh SS, Zimmerman B, McCarthy MJ, Podhajsky P. Sysyemic diseases associated with various types of retinal vein occlusion. Am J Ophthalmolol 2001;131:61-77.
29. Rath EZ, Frank RN, Shin DH, Kim C. Risk factors for retinal vein occlusions. A case-control study. Ophthalmology 1992;99:509-514.
30. Kumar A, Tiwari HK, Singh RP, Verma L, Prasad N. Comparative evaluation of early vs. deferred vitrectomy in Eales' disease. Acta Ophthalmol Scand 2000;78(1):77-78.
31. Thakar M, Bamrolia NR, Raina UK, Ghosh B. Intravitreal bevacizumab as an adjunct to vitrectomy in advanced Eales' disease. J Ophthalmic Inflamm Infect 2012;2(2):105-108.
32. Micieli JA, Easterbrook M. Eye and Orbital Injuries in Sports. Clin Sports Med 2017;36(2):299-314.
33. Horn EP, McDonald HR, Johnson RN, Ai E, Williams GA, Lewis JM, et al. Soccer ball-related retinal injuries: a report of 13 cases. Retina 2000;20(6):604-609.
34. De La Hoz Polo M, Torramilans Lluis A, Pozuelo Segura O, Anguera Bosque A, Esmerado Appiani C, Caminal Mitjana JM. Ocular ultrasonography focused on the posterior eye segment: what radiologists should know. Insights Imaging 2016;7(3):351-364.
35. Dastevska-Djosevska E. Ultrasonography in ocular trauma. Pril (Makedon Akad Nauk Umet Odd Med Nauki) 2013;34(2):105-113.
36. Guyomarch J, Jean-Charles A, Acis D, Donnio A, Richer R, Merle H. Polypoidal choroidal vasculopathy: clinical and angiographic features. J Fr Ophtalmol 2008;31(6 Pt 1):579-584.
37. Schneider U, Gelisken F, Inhoffen W. Clinical characteristics of idiopathic polypoidal choroid vasculopathy. Ophthalmologe 2001;98(12):1186-1191.
38. Hasegawa T, Otani A, Sasahara M, Gotoh N, Ooto S, Tamura H, et al. Prognostic factors of vitreous hemorrhage secondary to exudative age-related macular degeneration. Am J Ophthalmol 2010;149(2):322-329.
39. Spielberg L, Leys A. Treatment of neovascular age-related macular degeneration with a variable ranibizumab dosing regimen and one-time reduced-fluence photodynamic therapy: the TORPEDO trial at 2 years. Graefes Arch Clin Exp Ophthalmol 2010;248(7):943-956.
40. Ogino T, Takeda M, Imaizumi H, Okushiba U. Study of the causes of poor visual prognosis in photodynamic therapy for age-related macular degeneration. Nippon Ganka Gakkai Zasshi 2007;111(4):309-314.
41. Shunmugam M, Shah AN, Hysi PG, Williamson TH. The pattern and distribution of retinal breaks in eyes with rhegmatogenous retinal detachment. Am J Ophthalmol 2014;157(1):221-226.e1.
42. Hayreh SS, Jonas JB. Posterior vitreous detachment: clinical correlations. Ophthalmologica 2004;218(5):333-343.
43. Medele RJ, Stummer W, Mueller AJ, Steiger HJ, Reulen HJ. Terson's syndrome in subarachnoid hemorrhage and severe brain injury accompanied by acutely raised intracranial pressure. J Neurosurg 1998;88(5):851-854.
44. McCarron MO, Alberts MJ, McCarron P. A systematic review of Terson's syndrome: frequency and prognosis after subarachnoid haemorrhage. J Neurol Neurosurg Psychiatry 2004;75(3):491-493.
45. Sung W, Arnaldo B, Sergio C, Juliana S, Michel F. Terson's syndrome as a prognostic factor for mortality of spontaneous subarachnoid haemorrhage. Acta Ophthalmol 2011;89(6):544-547.
46. Narayanan R, Taylor SC, Nayaka A, Deshpande R, St Aubin D, Hrisomalos FN, et al. Visual Outcomes after Vitrectomy for Terson Syndrome Secondary to Traumatic Brain Injury. Ophthalmology 2017;124(1):118-122.