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Prevalence of posterior vitreous detachment detected by ultrasound in Erbil governorate

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Abstract

Background and objective: Posterior vitreous detachment is a common problem which may induce several potentially serious events. The aim of the study was to determine the prevalence of posterior vitreous detachment in Erbil and its distribution among different age groups also to determine its correlation to age, gender, smoking, blurring of vision, floater, flashes of light, diabetes mellitus and hypertension.

Methods: A cross-sectional study carried out on 150 persons (300 eyes) with mean age of 40 years attending Rizgary Teaching Hospital (Erbil, Iraq) who were referred for ultrasound examination for any indication other than eye problem. The patients were examined by ocular ultrasound unit equipped with a 7.5–10 MHz real-time linear high-frequency probe with the contact method.

Results: The prevalence of posterior vitreous detachment was 19.3%, with an extremely statistical significant association between posterior vitreous detachment and increasing age, diabetes, hypertension, blurred vision and floater, but no association with smoking, gender and flash of light.

Conclusion: Posterior vitreous detachment is a common disease its prevalence increases with advancing age with a strong association to blurred vision, floaters, diabetes mellitus and hypertension but no association with gender, smoking or ultrasound detected vitreous opacities.

Keywords: vitreous detachment, Ultrasound, Erbil.

Introduction

The most important age-related change in the human vitreous gel is posterior vitreous detachment (PVD) defined as a separation between the posterior vitreous cortex and the internal limiting membrane (ILM) of the retina[1]. Autopsy studies revealed that the incidence of PVD is 63% by the eighth decade[2]. PVD represents the culmination of the aging and liquefaction of human vitreous and may induce several potentially serious pathologic events at the vitreoretinal interface[1,3-7] .It is the initiating event of most retinal detachments although only 10% of PVD's will develop a retinal tear[8]. Clinically "Floaters" is the most common complaint of patients with PVD which is perceived as a gray," cobwebs, hair-like or fly-like" structure. Less frequently complaint of PVD is "light flashes"[2]. The most common complications of PVD include retinal or optic disc hemorrhage, vitreous hemorrhage, retinal tear, and rhegmatogenous retinal detachment[7,9-11]. U/S images of the eye give an accurate 2D representation of the normal anatomical structures[12-14]. It is the most practical method of obtaining images of the posterior segment of eye when the light-conducting media are opaque as in cataract and vitreous hemorrhage[12,13]. It is well tolerated by patients, relatively easy to perform in a short period of time, safe (not using ionizing radiation) and cost-efficient as well as without contraindications[12,15]. B-scan ultrasonography performed with the probe directly perpendicular to the macula (axial view) has been found to be a

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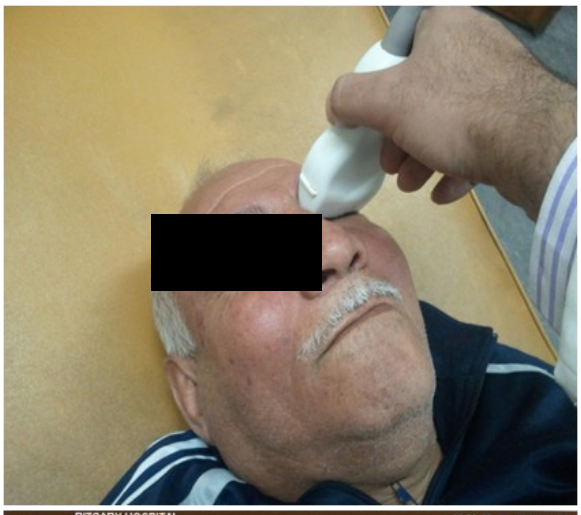
Sensitive method for detecting partial posterior hyaloid separations from the retina[3,16-18]. The aim of this study was to determine the prevalence of posterior vitreous detachment in a sample of patients attending Rizgary outpatient clinic and its distribution among different age groups and to determine the association of age, gender, smoking, blurring of vision, floater, flashes of light, diabetes mellitus and hypertension with posterior vitreous detachment.

Methods

A cross-sectional study convenient sampling is carried out on 150 persons (300 eyes) with ages between 15-76 years old (mean age of 40 years) attending Rizgary Teaching Hospital, Erbil, Iraq, who were referred for ultrasound examination for any indication other than eye problem during the period from May 2011- Jan 2012 and they were examined by ocular ultrasound using ultrasound units (Siemens Sonoline Prima, Philips, and Shimadzu) equipped with a 7.5–10 MHz real-time linear high-frequency probe with the contact method. Exclusion criteria included those with previous ocular operation (cataract surgery, refractive surgery), ocular trauma and high refractive errors (over 6D myopia and over 4D hypermetropia). Patients were examined in sitting or supine position, acoustic gel applied to the transducer; the transducer placed in direct contact against closed eyelid with gently pressing it over the eye , Figure 1. Transverse and longitudinal views were obtained. When the vitreous gel came into the view, we first scanned the globe in the primary position (straight gaze), followed by asking the patient to move the eyeball from side to side frequently, the Posterior Vitreous Detachment appeared as thin membrane undulating on eye movement, Figure 2. Data were collected by direct interview with the patients using specially designed questionnaire. After ethical approval was obtained for the study by Ethics Committee of Hawler Medical University, verbal consent was taken from all the enrolled patients who had been informed about the purpose and procedure of the study.



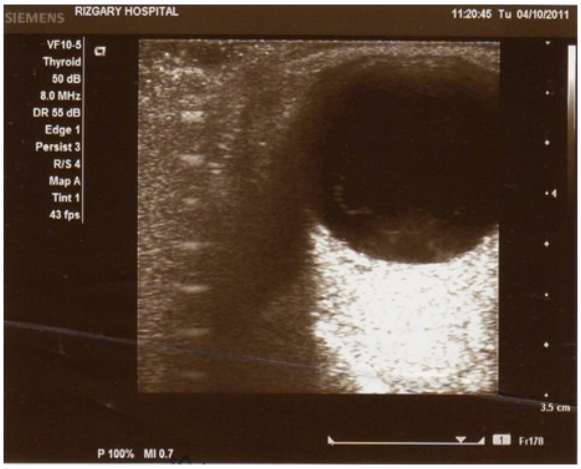


Figure 1: Transverse scan with **Figure 2**: Ultrasound image of a patient real-time linear high-frequency probe. With PVD taken during the research.

Data were analyzed using the statistical package for social sciences (SPSS version 18). Chi-square test of association was used to show the significance of association between posterior vitreous detachment and different factors. When the expected count of more than 20% of cells of row x column table was less than 5, Fisher's exact test was used instead of chi-square. A P- value equal or less than 0.05 was considered as statistically significant [19].

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Results

In the sample of 150 patients, the patients were divided into 3 groups according to their age. The prevalence of PVD in our sample was 29 patients out of 150 patients (19.3%), with an extremely statistical significant association between PVD and increasing age (P < 0.001), Table 1. Table 1 also shows the relation of gender to PVD, with gender distribution of 11 (18.0%) out of 61 male and 18(20.2%) out of 89 female. It is found that there is no statistically significant association between PVD and gender (P = 0.738). No statistically significant association is observed between the prevalence of PVD and smoking or ultrasound detected vitreous opacities, with P value of 0.738 and 0.685, respectively. Tables 1 and 3 show these relations respectively. The prevalence of PVD in patient with no blurred vision or floaters was 12.0% and11.8% respectively while those with blurred vision or floaters, the prevalence was 28.4% and 40% respectively, Table 2, hence indicating a statistically significant association between PVD and symptoms of blurred vision or floaters (P = 0.012 and P=0.001,respectively). Table 2 depicts that the prevalence of PVD in those who don't have flashes of light was 17.7% while those who have flashes of light was 44.4%. It is concluded that there is no statistically significance association between PVD and flashes of light (P = 0.071). Again a statistically significance association between PVD and diabetes mellitus or hypertension was observed (P = 0.001 & 0.016, respectively) with the prevalence of PVD in those who don't have diabetes mellitus or hypertension was 17.1% and 16.4 respectively, while those who have diabetes mellitus or hypertension was 100% and 43.8% respectively, Table 3.

Table 1: Prevalence of PVD and its association to age, gender and smoking.

Variable	N	Prevalence of PVD		P
Age (years)		**No.**	**%**	
< 35	67	4	6.0	
35-54	50	9	18.0	<0.001
55+	33	16	48.5	
Total	150	29	19.3	
Gender				
Male61	61	11	18.0	0.738
Female	89	18	20.2	
Smoking				
No	134	27	20.1	0.738
Yes	16	21	2.5	
Total	150	29	19.3	

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Table 2: Relationship of blurring of vision, floaters and flashes of light to PVD.

Variable	N	Prevalence of PVD		P
		No.	%	
Blurring of vision				
No	83	10	12.0	0.012
Yes	67	19	28.4	
Total	150	29	19.3	
Floaters				
No	110	13	11.8	<0.001
Yes	40	16	40.0	
Total	150	29	19.3	
Flashes of light				
No	141	25	17.7	<0.071
Yes	9	16	44.4	
Total	150	29	19.3	

Table 3: Relationship of diabetes mellitus, hypertension and vitreous opacities by U/S to PVD.

Variable	N	Prevalence of PVD		P
		No.	%	
DM				
No	146	25	17.7	0.001
Yes	4	4	100.0	
Total	150	29	19.3	
Hypertension				
No	134	22	16.4	0.016
Yes	16	7	43.8	
Total	150	29	19.3	
U/S detected vitreous opacities				
No	113	21	18.6	0.685
Yes	37	8	21.6	
Total	150	29	19.3	

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Discussion

PVD is a common disease but despite of this fact its prevalence was not studied in Erbil. In this study, 29 out of 150 patients (19.3%) had PVD, this result is nearly comparable to Dawood *et al*[20], Hikichi*et al*[21] and Ahmed A M[15] whose results were 19.2%, 20% and 14.6% respectively. The prevalence of PVD increased with increased age from 6.0% below 35 years, 18.0% at 35-54 years to 45.5% above 55 years with a statistically significant association between advancing age and PVD ($p < 0.001$) and this is in agreement with Schwab *et al*[22] (Austria), Hayreh*et.al*[23] (USA), Weber-Krause *et.al*[24] (Germany) who showed that prevalence of PVD increased with advancing age. The prevalence of PVD was 18.0% in males while it was 20.2% in females with no statistically significant association between them which means both genders have similar prevalence, this result is comparable with Schwab *et al*[22] (Austria) and Tanner *et al*[25] (UK) . Our result regarding the relationship of smoking to PVD showed no statistically significant association between non smokers and smokers in developing PVD. This means smoking may not be a risk factor in developing PVD, but no previous data were available assessing this relationship to be compared with. Prevalence of PVD in those persons who have blurred vision (28.4%) was about double than those who don't have blurred vision (12%) ($p = 0.012$), again to our knowledge no previous data were available for comparison to be made, and this may raise the idea that further studies should be conducted to confirm & support these results and to shows the relationship of smoking & blurred vision to PVD. For the association of PVD and floaters, our results showed statistically significant association as 40% of persons with floater symptom have PVD while only 11.8% of persons who don't have floaters have PVD ($p < 0.001$), this result is comparable to the result of Hikichi *et al*[21] (US) who had the same result with $P = 0.04$, but lower than Murakami *et al*[26] (Japan) whose result was 83% and this is because he dealt with older age groups.Regarding the relationship of PVD and symptom of flashes of light, although it showed no statistical significance ($p = 0.071$) but it is noted that PVD is 2.5 times higher in person who have flashes of light than those who don't have it (44.4% in those with flash of light, 17.7% with no flashes of light), our result was lower than Hikichi *et al*[21](US) whose result showed 67% of persons who have flashes of light have PVD with $p = 0.01$ and this difference can be explained that most of our patients can't understand what does flashes of light really mean which might lead to a subjective bias. Concerning the relationship of diabetes mellitus and PVD, it showed that there is a high prevalence of PVD among patients with diabetes mellitus in which only 17.1% of patients with no diabetes mellitus have PVD while 100% patients with diabetes mellitus have PVD, with a statistically significant association ($p = 0.001$), these results are comparable to another study done by McLeod *et al*[27] (UK) who showed the prevalence of PVD in 154 patients with diabetes mellitus was 96%. This is explained by proliferative retinopathy in which new blood vessels, arising as a response to retinal ischemia, penetrate the inner limiting lamina of retina and grows within the cortical gel to form vascularisedepiretinal membrane. There are 2 important consequences of diabetic epiretinalvasoproliferation: (i) fibrous contraction within the epiretinal membrane; and (ii) separation of the cortical gel from the retina[27]. Concerning the relationship of hypertension to PVD, our result showed that prevalence of PVD was higher in hypertensive patients (43.8%) than those who don't have hypertension (19.3%) and this may be due to the prevalence of hypertension is high in older age group and in older age group there will be a higher prevalence of PVD than younger age group as we discussed. Regarding the relationship of PVD to ultrasound detected vitreous opacities, there was no statistically

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significant difference in prevalence of PVD in those patient who don't have vitreous opacity (18.6%) and those who have vitreous opacity (21.6%) (p = 0.685).

Conclusion

Posterior vitreous detachment is a common disease. It's prevalence increases with advancing age with a strong association with blurring of vision, floaters, diabetes mellitus and hypertension and no association to gender, smoking or vitreous opacities has been detected.

References

1. Sebag J. The Vitreous: Structure, function, and pathobiology. New York: Springer-Verlag; 1989. P. 80–95.
2. Sebag J. Vitreous anatomy and pathology. In: Yanoff M, Duker J S, Augsburger J J, Azar D T, Diamond G R, Dutton JJ, et al. editors. Ophthalmology. 3rd ed. St Louis: Mosby; 2009. P. 766-73.
3. Johnson M W. Perifoveal vitreous detachment and its macular complications. Michigan: Trans Am OphthalmolSoc 2005; 103:537-67.
4. Jaffe NS. Complications of acute posterior vitreous detachment.Arch Ophthalmol1968; 79:568-71.
5. Foos RY, Wheeler NC. Vitreoretinal juncture: Synchysissenilis and posterior vitreous detachment. Ophthalmology1982; 89:1502–12
6. Wilkinson CP, Rice TA. Michels Retinal Detachment. 2nded. St Louis: Mosby; 1990: 30–4.
7. Gass JDM. Stereoscopic Atlas of Macular Diseases: Diagnosis and Treatment.4th ed. St Louis: Mosby; 1997. P. 904-51.
8. Posterior Vitreous Detachment: Floaters and Flashes. Vitreous-Retina-Macula Consultants of New York. 2009 (Accessed 2012 Jan 7). Available from: http://www.vrmny.com/pe/pvd.html.
9. Novak M A, Welch RB. Complications of acute symptomatic posterior vitreous detachment.Am J Ophthalmol1984; 97:308-14.
10. Jaffe N S. Vitreous traction at the posterior pole of the fundus due to alternations in the vitreous posterior. Trans Am AcadOphthalmolOtolaryngol1967; 71:642-52.
11. Smiddy W E. Vitreomacular traction syndrome. In: Yanoff M, Duker J S, Augsburger J J, Azar D T, Diamond G R, Dutton JJ, et al, editors. Ophthalmology. 3rd ed. St Louis: Mosby; 2009. P.691–5.
12. Aironi V D, Gandage S G. Pictorial essay: B-scan ultrasonography in ocular abnormalities:Indian Journal of Radiology and Imaging 2009; 19(2):109 –15.
13. Coleman J D. Ultrasonography of eye and orbit. 2nd ed. Lippincott: Williams and Wilkins; 2006. P. 47–122.
14. John AF. The eye and orbit. In: Cosgrove D, editors. Clinical Ultrasound.2nd ed. London: Elsevier; 2001. P. 659–95.
15. Ahmed A M. Ultrasonographic evaluation of the eye. High Diplomathesis in Diagnostic Radiology. Dohuk:Dohuk University, College of Medicine; 2009.
16. Johnson M W, Van Newkirk M R, Meyer K A. Perifoveal vitreous detachment is the primary pathogenic event in idiopathic macular hole formation. Arch Ophthalmol2001; 119: 215–22.
17. Van Newkirk M R, Gass JDM, Callanan D. Follow-up and ultrasonographic examination of patients with macular pseudo-operculum.Am J Ophthalmol1994; 117: 13–8.
18. Van Newkirk M R, Johnson M W, Hughes J R. B-scan ultrasonographic findings in the stages of idiopathic macular hole. Trans Am Ophthalmol-Soc2000; 98: 163–71.
19. Petrie A, Sabin C. Medical statistics at a glance.1st ed. London: Alden press; 2000. P. 64.
20. Dawood Z, Mirza S A, Qadeer A. Role of B-Scan Ultrasonography for Posterior Segment Lesions. J Liaquat.Uni Med Health Sci 2008; 7(1):7-12.
21. Hikichi T, Trempe C L. Relationship between floaters, light flashes, or both, and complications of posterior vitreous detachment.Am J Ophthalmol1994;117(5):593-8.
22. Schwab C, Ivastinovic D, Borkenstein A, Lackner E M, Wedrich A, Velikay M. Prevalence of early and late stages of physiologic PVD in emmetropic elderly population. ActaOphthalmol 2012; 90 (3):e179-84.
23. Hayreh SS, Jonas JB. Posterior Vitreous Detachment: Clinical Correlations. Ophthalmologica2004; 218:333–43.
24. Weber-Krause B, Eckardt C. Incidence of posterior vitreous detachment in the elderly. Ophthalmology 1997; 94(9):619-23.
25. Tanner V, Harle D, Tan J, Foote B, Williamson T H,Chignell A H. Acute posterior vitreous detachment: the predictive value of vitreous pigment and symptomatology. Br J Ophthalmol2000; 84:1264-8.
26. Murakami K, Find all citations by this author (default) Or filter your current search Jalkh A E, Find all citations by this author (defau\Or filter your current search Avila M P, Find all citations by this author (default).Or filter your current search Trempe C L, Find all citations by this author (default).Or filter your current search Schepens C L. Vitreous floaters.Ophthalmology1983; 90(11): 1271-6.
27. McLeod D, Restori M. Ultrasound examination in severe diabetic eye disease. Br J ophthalmol 1979; 63:533-8.