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Posterior vitreous detachment-study of prevalence, symptoms and risk factors for retinal tears

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Abstract
Purpose: To describe clinical characteristics of patients who presented with acute symptomatic posterior vitreous detachment (PVD) and determine the prevalence and predictors of retinal tears and retinal complications.
Material and methods: 250 patients who presented in RIO, PGIMS, Rohtak, Haryana with clinical diagnosis of acute symptomatic PVD were examined and followed up over a period of 1 year.
Results: A total of 250 patients who presented with acute PVD-related symptoms like floaters, flashes of light or deterioration in vision were enrolled in our study. Incidence of retinal tear was found to be 8% (n=20) and that of vitreous hemorrhage or retinal hemorrhage was 14% (n=35) in our study group over a period of 1 year. Predictors of retinal tears were visual impairment, vitreous hemorrhage and duration of symptoms <1 week. Perception of flashes of light by patients was not found to be a significant risk factor for retinal tear. Subsequent retinal pathologies including retinal detachment were found to be higher in the affected eye during the follow up period.
Conclusion: In acute PVD, symptoms of visual loss, vitreous and/or retinal hemorrhage and duration of symptoms less than one week have higher risk of associated retinal tear and increased risk of retinal detachment in follow-up period.

Keywords: Posterior vitreous detachment, retinal tear, vitreous hemorrhage

Introduction

Posterior vitreous detachment (PVD) is a spontaneous condition which occurs mostly after age of 50 years and its prevalence increases with the advancing age. It is reported to be 24% in age group 50-60 years and as high as 87% in 80-90 year age group [1, 2] Vitreous is normally a gel like substance in early phases of life which is composed of collagen fibers, hyaluronic acid and water (99%) and it accounts to 2/3rd of the volume of eye ball [3]. Vitreous starts degenerating with advancing age from gel like structure in young age to more liquefied stage in older population [4]. In <50 year age group, only 25% of vitreous exists in water phase which increases to 65% at the age of 80 years. Secondary ocular conditions which contribute and exaggerate the physiological senile vitreous liquefaction include ocular inflammation, ocular trauma and cataract surgery. Pseudophakic eyes are more at risk for PVD than phakic eyes. This physiological liquefaction of vitreous gel can cause retinal damage through traction with retinal tear and/or hemorrhage and consequently retinal detachment (RD) after collapse of vitreous gel.

Patients with PVD present with varied symptoms and more than 20% of patients are even asymptomatic [5]. The most common symptom occurring in symptomatic PVD is floaters, which are caused due to aggregated collagen fibers with shriveling vitreous casting shadow on retina. Severity of floaters and their increasing number after initial PVD may signal a serious retinal pathology including retinal tear. Second common symptom in patients with PVD is flashes of light which are caused by traction on retina, where vitreous is firmly adhered to latter. Retinal tears may also be the cause for floaters and flashes of light in the periphery [6, 7]. Retinal tears secondary to traction from trauma or PVD are typically horseshoe shaped and if they are sufficiently large, vitreous will gain entry into the subretinal space leading to rhegmatogenous retinal detachment (RRD) [8].

Perception of flashes of light usually resolves after complete vitreous separation from retinal surface and not correlated with development of any retinal tear. Third symptom of PVD is

decrease in vision which occurs secondary to dense vitreous hemorrhage or retinal detachment. Small retinal hemorrhages, floaters or peripheral retinal tear as such do not decrease visual acuity but latter is usually associated with serious retinal pathologies requiring urgent intervention. Differentiating an acute PVD from retinal tears can be difficult based on history alone. Hollands *et al* found that 14% of patients presenting with acute PVD with floaters and/or flashes have a retinal tear; however, if there is no subjective decline in visual acuity, this risk decreases to 8.9% only. Conversely, if the patient reports a subjective decrease in visual acuity or a vitreous haemorrhage is seen, then the risk of retinal tear increases to 45% and 62%, respectively. If pigment is noted in vitreous (i.e. Shaffer's sign), then the risk of a retinal tear is as high as 88%. In patients who are diagnosed to have a PVD without a retinal tear, 3.4% developed retinal tear within six weeks of initial presentation [9]. Therefore, all patients must undergo repeat dilated fundus examination with indentation within 6 weeks of their first presentation.

The risk of damage to retina occurring in symptomatic PVD patients varies in different studies from 8.2% to 47.6% [10-12] Retinal tear and vitreous hemorrhage are usually present in acute PVD cases at their first examination and if not, then it is unlikely to be found on follow-ups. Retinal tear occurring in cases of acute PVD can cause retinal detachment by separation of neuroretina from underlying retinal pigment epithelium by entry of liquefied vitreous into tear. Ultimately retinal detachment causes complete vision loss by photoreceptor death if not treated urgently [13].

The aim of this study was to evaluate the clinical symptoms of acute PVD (floaters, flashes of light, deterioration in vision) which predict complications such as RD, tear and vitreous hemorrhage and to find correlation of these complications with the duration of symptoms prior to first consulting an ophthalmologist.

Material & Methods

250 patients who presented in RIO, PGIMS Rohtak with clinical diagnosis of acute symptomatic PVD were enrolled in our study and followed up over a period of 1 year. Perception of floaters along with flashes of light and decrease in visual acuity was considered sufficient to diagnose vitreous detachment and presence of Weiss ring was not considered mandatory for the same.

Inclusion criteria

Patients presenting with sudden onset of floaters, flashes of light and decreased vision were included in our study.

Exclusion criteria

Any pre-existing retinal detachments resulting from ocular trauma or previous vitreoretinal surgery.

Patients who were enrolled in our study were enquired about their symptoms (floaters, flashes, visual deterioration), duration of symptoms before first examination and any previous PVD-related symptoms. Patients were examined meticulously on the same day when they presented to us and were also enquired in detail about past history. The standard examination included visual acuity on Snellen's chart, confrontation visual fields, pupillary reactions, anterior segment examination, IOP measurement by Goldman applanation tonometry and dilated fundus examination using a slit-lamp biomicroscope and indirect ophthalmoscope. All patients were informed and educated about the warning signs of retinal detachment, which included new onset or increasing frequency of their flashes or floaters and visual field deficits. Follow up visits were made more frequent if patients complained of symptoms of flashes in combination with multiple floaters or a curtain or cloud and increase in severity of symptoms after initial examination. Meticulous retinal peripheral examination with scleral indentation was done by indirect ophthalmoscopy to detect any retinal tear. A follow up for one year was done for PVD patients and principal outcome measure was the presence of retinal tear or vitreous hemorrhage on initial or follow-up examination. During first examination or in follow up, if any complication occurred, it was treated urgently including laser or cryotherapy for retinal tear and vitreous surgery for non-resolving vitreous hemorrhage and retinal detachment surgery was also performed, though latter's prevalence was low.

Result

A total of 250 patients who presented with acute posterior vitreous detachment (PVD) symptoms were enrolled in our study and reviewed periodically over a period of 1 year.

In this study, mean age of patients was found to be 63.5±11.4 years. Out of 250 patients, 58% were females (n=145) and 42% were males (n=105) which signifies a female preponderance with M:F ratio of 2:3 (Figure 1).

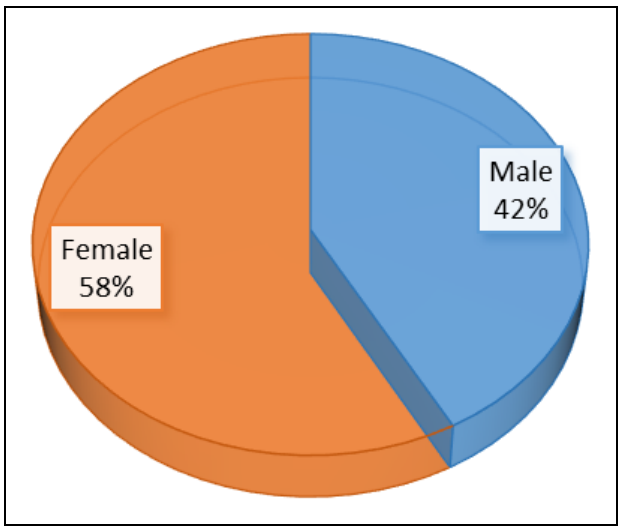

Fig 1: Gender distribution

In this study, 175 (70%) eyes were pseudophakic and 75 (30%) eyes were phakic. Out of 175 pseudophakic eyes, 80 patients had history of cataract surgery in last one year.

Most common presenting symptom of acute PVD was floaters in 215 patients, flashes of light in 120 patients and diminution of vision in 15 patients only (Figure 2).

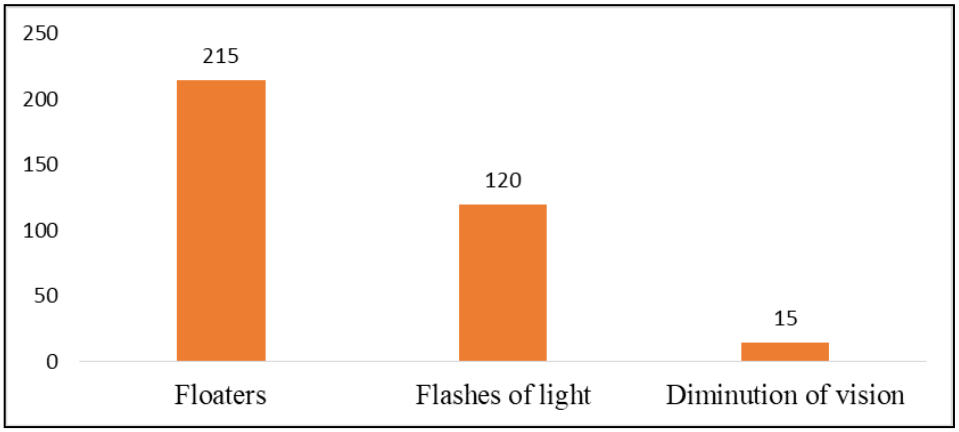

Fig 2: Presenting manifestation of Acute PVD

In our study, 82% patients presented within 1 week of onset of symptoms, 14% patients presented within 1 week to 1 month duration and rest 4% presented within one month to one year of onset of symptoms. Patients who sought care within a few days of onset of symptoms had a significantly higher risk of having a retinal tear.

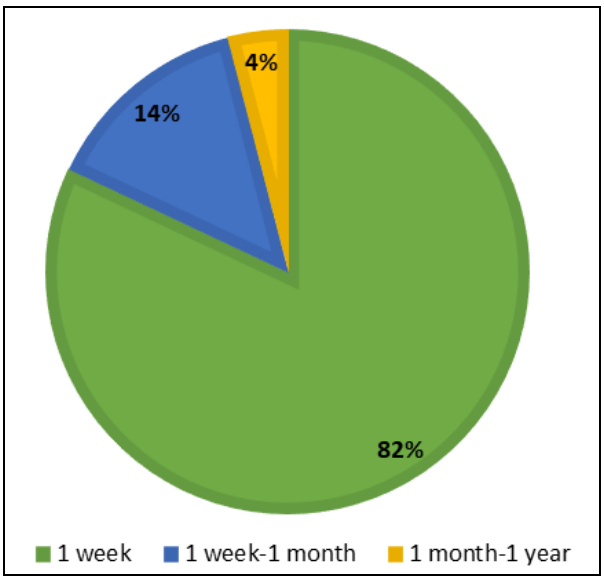

Fig 3: Time of presentation in Acute PVD patient

In our study, 77.5% cases of acute PVD had no complication neither at presentation nor in follow up period of 1 year. Out of 22.5% complicated cases of PVD, most common complication was vitreous hemorrhage in 35 patients (14%) followed by retinal tear in 20 patients (8%) and retinal detachment in 2 patients (0.5%) (Figure 4). Vitreous hemorrhage was the main reason of vision loss from mild to significant, depending upon the severity of vitreous hemorrhage. Patients with significant non resolving vitreous hemorrhage and retinal detachment were surgically managed.

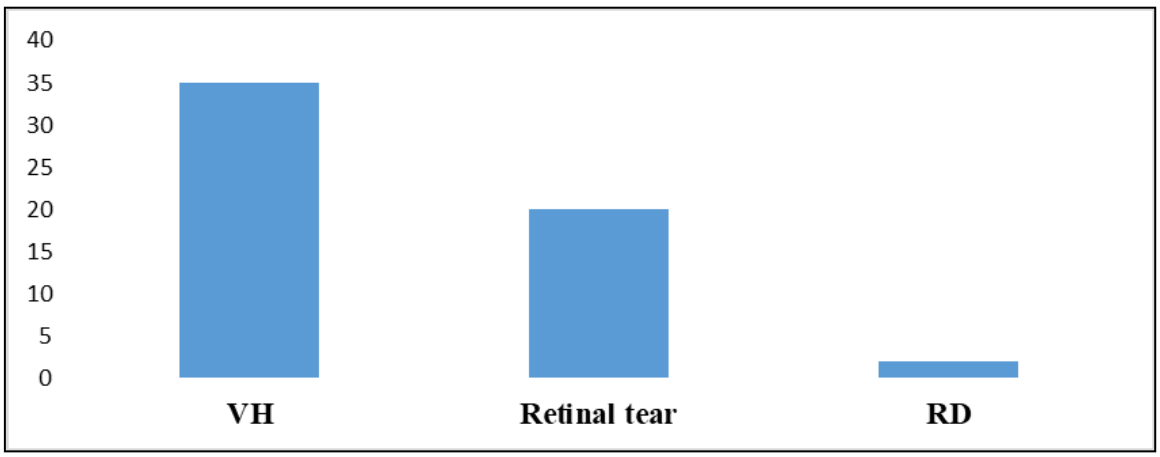

Fig 4: Frequency of complications in Acute PVD

Discussion

The incidence of retinal tear in patients of posterior vitreous detachment was found to be 8% and that of vitreous hemorrhage was 14%, during a total follow up period of one year. The incidence of retinal tear was found to be almost similar as in previous studies while incidence of vitreous hemorrhage was lower [11, 12]. Patients who presented immediately or early after onset of symptoms of acute PVD had significantly higher incidence of retinal tear in comparison to those patients who presented late. This time difference in presentation may reflect presence of more severe symptoms in PVD associated with retinal tear. In a similar study regarding duration of symptoms by Dayan *et al*, symptoms of duration of less <6 weeks was associated with a higher risk of retinal tears.[12] When lens status was compared, PVD was found to be more prevalent in pseudophakic eyes and hence cataract surgery is a definite risk factor for development of PVD. Aphakic eyes have high incidence of PVD and associated retinal complications than pseudophakia because of its role in vitreous liquefaction. In this study, 70% eyes were pseudophakic with majority having history of cataract surgery in previous one year and remaining 30% were phakic.

In this study, visual impairment was found to be a significant predictor for any associated retinal pathology in cases of PVD, which is similar to other previous study which showed 67% of patients having decreased visual acuity had retinal tears or detachment while in patients with floaters or flashes of light, only 19% were found to have retinal tear.[13] When severity including number of floaters was correlated with retinal tear, studies in past had shown increased risk of retinal complications in those cases of PVD who present with severe symptoms on initial examination.[14-16] In a study by Byer, 29% of patients with severe symptoms had associated retinal tear and it was concluded that early vitreoretinal examination is must for early detection of retinal tear to avoid complications like rhegmatogenous retinal detachment.[17]

Majority of symptomatic PVD patients presented with floaters and such patients exhibited vitreous opacities during ophthalmological examination. In patients of vitreous floaters, Weiss ring was found in majority (>90%) on examination confirming the complete posterior detachment of vitreous.

The risk of retinal tear is also increased in patients who had vitreous or retinal hemorrhage at initial examination. In a study by Sarrafizadeh *et al*, retinal tear risk increases from 4-5% to 30-90% in cases of vitreous hemorrhage in PVD.[18] In the present study, presence of hemorrhage was significantly higher in patients of retinal tear (66%) than those not having any retinal tear (12%). In majority of vitreous hemorrhage, retinal vessels which are near to retinal tear are ruptured and traction of vitreous pulls vessels causing bleeding. If vitreous hemorrhage is significant, it can cause dense opacity in vitreous leading to diminution of vision.

Posterior vitreous detachment usually occurs in other eye also within a short period of few months to 1-2 years' time since it is a parallel process in both the eyes. Patient should be explained about the same and his other eye should be thoroughly examined to look for any retinal tear or asymptomatic PVD [19]. Multiple floaters, a curtain or cloud, hemorrhages (retinal or vitreous) at the initial examination and increase in the number of floaters after the initial examination were found to be the strong predictors for the development of retinal tears in patients of PVD. In this study, the symptomatology of PVD including floaters, flashes of light and decrease in vision were considered for diagnosis of symptomatic PVD. Hence patients who had very little symptoms or who were asymptomatic were not enrolled in the study and therefore actual prevalence of retinal tears in all cases of PVD was not determined by this study. Ideally, diagnosis of PVD should include ultrasound or optical coherence tomography and demonstration of Weiss ring on ophthalmoscopy. In the present study, this was a limitation since it involved specific symptoms of PVD to establish the diagnosis.

Conclusion

When patients of PVD come for ophthalmological checkup, prompt attention and meticulous examination is needed especially in those patients who present with visual impairment and seek care urgently i.e. within 24 hours of onset of symptoms. Patients with only floaters as a symptom and long duration of symptoms without any vision loss may be regarded as low risk for retinal complications including retinal tears. In this study, almost 90% patients who had retinal tear was detected on first examination or within one week only. Rest 10% of patients of retinal tear were detected within one month of presentation and no new retinal complication occurred in follow up period of one year. All retinal complications including retinal tear, non-resolving vitreous hemorrhage and retinal detachment were properly managed with good visual recovery. Therefore, all symptomatic PVD patients must be examined meticulously and followed up for at least a period of one year.

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