

SURGICAL APPROACH IN VITREOUS HEMORRHAGE: TIMING OF VITRECTOMY FOR VARIOUS RETINAL DISORDERS

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ABSTRACT

Introduction: To report cases of retinal disorders that cause vitreous hemorrhage and the timing of pars plana vitrectomy in Cicendo Eye Hospital

Methods: Retrospective observational study of all patients diagnosed with the vitreous hemorrhage who had undergone pars plana vitrectomy in 2016. Data were collected from medical record.

Result: The mean age of this study is 54.65 years old from 260 vitreous hemorrhage patients. The most common retinal abnormalities are proliferative diabetic retinopathy (49.6%), wet age related macular degeneration (AMD) (13.5%), undetected retinal abnormalities (12.7%), retinal vein occlusion (8.8%), rhegmatogen retinal detachment (6.5%), trauma (3.45%), vasculitis (3.1%), idiopathic polypoidal choroidal vasculopathy (3.1%), and drop IOL (1.2%). PPV performed 1-3 months after initial assessment (31.25%), less than 1 month (13.2%), more than 3 months (14.6%)

Conclusion: The most common etiology of vitreous hemorrhage is proliferative diabetic retinopathy. Pars plana vitrectomy was performed 1 – 3 months after an initial assessment of the patients.

Keywords: vitreous hemorrhage, pars plana vitrectomy, retinal abnormalities

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INTRODUCTION

Vitreous hemorrhage is the existence of blood extravasation in a space confined by the layer of membrana limitans interna of the retina in its posterior, ciliary body in the anterolateral and posterior lens capsule in the anterior. The incident of vitreous hemorrhage is around 7 cases in 100,000 populations. Based on the pathogenesis, the causes of vitreous hemorrhage can be classified into ischemia caused by abnormalities in retinal vascular, abnormalities of retinal vascular which does not relate to retinal ischemia, the normal rupture of retinal blood vessels, and the subretinal hemorrhage which penetrates vitreous. The most common causes of spontaneous vitreous hemorrhage are proliferative diabetic retinopathy (32%), retinal tear (30%), retinal vein occlusion (11%), and posterior vitreous detachment (PVD) without retinal tear (8%).^{1,2,3}

The most frequent symptom complained by the patient is the immediate decrease of visual acuity or floaters without pain. The history of systemic diseases, such as diabetes mellitus, hypertension, the use of drugs, and stroke can give an important clue in diagnosis before the eye examination.^{1,3,4}

Two others most frequently used methods of the management of vitreous hemorrhage are observation and pars plana vitrectomy. The observation is performed in the case of vitreous hemorrhage in which the causes threatening the vision are not found. Vitrectomy is performed in the case of permanent vitreous hemorrhage or when the hemorrhage blocks the therapy administration on the pathological area. The time is chosen for the intervention depending on its condition and etiology.^{3,5}

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This research aims to see the characteristic of retinal abnormalities in patients with vitreous hemorrhage and the time for pars plana vitrectomy in Cicendo Eye Hospital.

SUBJECT and METHOD

This study is an observational with retrospective data collection. The data were taken from the medical record of patients visiting the retinal department of Cicendo Eye Hospital and diagnosed with the vitreous hemorrhage from January 2016 to December 2016. The collected data are age, gender, laterality, the clinical condition of patients at initial assessment (the visual acuity), the diagnosis of vitreous bleeding and when the vitrectomy is performed. The inclusion criteria of this research is all patients with vitreous hemorrhage, treated with pars plana vitrectomy. The exclusion criteria is if the hemorrhage happens after previous vitrectomy.

The examination of visual acuity was performed with Snellen chart; the systemic abnormalities were obtained based on the diagnosis by the specialist of internal medicine, and retinal abnormalities were obtained based on the diagnosis during pars plana vitrectomy. Time for pars plana vitrectomy was counted from the initial assessment of the patient in vitreoretinal department to the time when vitrectomy is performed.

The collected data were then processed descriptively on all variables and shown in the table.

RESEARCH RESULT

From January 2016 to December 2016, there were 260 patients with a diagnosis of vitreous hemorrhage treated with pars plana vitrectomy. Demographic characteristic of the patient is shown in Table 1. In one year, the data shows that there are 146 (56.2%) male patients and 114 (43.8%) female patients. The average age of patients is around 54.65 years old, with age range of 10 - 85 years old, vitreous hemorrhage is more common in the age range of 51-60 (35.8%), followed by 61-70 years old (24.6%) and 41-50 years old (18.2%). From 260 patients, the majority of vitreous hemorrhage was found in one eye (86.9%), while the bilateral vitreous hemorrhage was found in 27 patients (10.4%).

Table 1. Demographic characteristic of patient

Characteristic	Number (n=260 patients)	(%)
Gender		
Male	146	56.2
Female	114	43.8
Age (years old)		
<21		
21-30	4	1.5
31-40	12	4.6
41-50	18	6.9
51-60	47	18.2
61-70	93	35.8

71-80	64	24.6
>80	17	6.5
	5	1.9
Laterality		
Unilateral	233	89.6
Bilateral	27	10.4

Based on the clinical characteristic (table 2), the initial range of vision in patients, 0.8 to LP, was found. The most common initial visual acuity is 1/300-LP (48.4%), followed by 3/60-cffc (38.5%). Based on the examination, it was found that 31.5% of patients have the systemic abnormalities of hypertension and diabetes, 21.2% of patients have diabetes, 17.3% of patients have hypertension, and 30% of patients do not have systemic abnormalities. From all patients treated with pars plana vitrectomy, it is known that the most common retinal abnormality causing vitreous haemorrhage is proliferative diabetic retinopathy (49.6%), followed by wet amd (13.5%), RVO (8.8%), RRD (6.5%), trauma (3.4%), vasculitis (3.1%), IPCV (1.2%), and drop IOL (1.2%). Meanwhile, the abnormalities in retina were not detected in 33 patients (12.7%).

Table 2. Clinical characteristic of patient

Characteristic	Number of patient	%
Initial vision		
> 6/60	34	13.1
CF	100	38.5
1/300 – LP	126	48.4
Systemic abnormalities		
Hypertension	45	17.3
Diabetes	55	21.2
Ht + DM	82	31.5
None	78	30
Retinal abnormalities		
PDR	129	49.6
Wet amd	35	13.5
RVO	23	8.8
RRD	17	6.5
Trauma	9	3.4
Vasculitis	8	3.1
IPCV	3	1.2
Drop IOL	3	1.2
Undetected	33	12.7

Based on table 3, it can be observed that the majority of vitrectomy was performed in 1 - 3 months after the initial assessment of patient (54.2%). 81 (31.2%) of patients were treated with vitrectomy less than one month after their assessment. Meanwhile, 11.1% of patients were treated with vitrectomy after 3-6 months, and 3.5% of patients were treated after more than 6 months.

Table 3. Time of vitrectomy

Time	Number of patient	%
< 1 month	81	31.2
1 - 3 months	141	54.2
3 - 6 months	29	11,1
> 6 months	9	3,5

In table 4, it can be observed that in patients with diabetes mellitus, hypertension, and patients without systemic abnormalities, vitrectomy was done most frequently in 1-3 months.

Table 4. Time of vitrectomy based on systemic abnormalities

Time	DM (%)	HT (%)	None (%)
< 1 month	38 (27.7)	10 (23.3)	33 (42.3)
1-3 months	76 (55.5)	25 (58.2)	37 (47.4)
3-6 months	17 (12.4)	6 (13.9)	7 (9)
> 6 months	6 (4.4)	2 (4.6)	1 (1.3)

In table 5, it is found that in all patients with proliferative diabetic retinopathy (PDR), 55.8% of patients underwent operation in 1-3 months, 30.2% of them were in less than one month, 10.9% of them were in 3-6 months, and the rest 3.1% of patients were more than 6 months. Meanwhile, in RRD, 70.6% of patients were treated with vitrectomy in less than 1 month.

Table 5. Time of vitrectomy on PDR & RRD

Time	Patients	%
PDR		
< 1 month	39	30,2
1-3 months	72	55,8
3-6 months	14	10,9
> 6 months	4	3,1
RRD		
< 1 month	12	70,6
1-3 months	2	11,8
3-6 months	3	17,6

Preoperative and postoperative visions on vitreous hemorrhage caused by proliferative diabetic retinopathy and rhegmatogenous retinal detachment are shown in Table 6. In PDR, the most preoperative vision is finger-counting (55%), while the postoperative is more than 6/60 (34.9%). In RRD, the most preoperative vision is LP - 1/300 (53%), while the postoperative is finger-counting (53%).

Table 6. Preoperative and postoperative vision on PDR and RRD

Vision	Pre (%)	Post (%)
PDR		
NLP	-	1 (0,8)
LP - 1/300	44 (34,1)	42 (32,5)
CF	71 (55)	41 (31,8)
> 6/60	14 (10,9)	45 (34,9)

RRD		
NLP	-	1 (5,9)
LP - 1/300	9 (53)	3 (17,5)
CF	5 (29,3)	9 (53)
> 6/60	3 (17,7)	4 (23,6)

DISCUSSION

In this research, it was found that the most common cause of vitreous hemorrhage is proliferative diabetic retinopathy (49.6%). It is in accordance with study conducted by Spraul in which 31-54% of causes of vitreous hemorrhage are proliferative diabetic retinopathy. The result of this research is different from the research by Lean et al. in which 40% of vitreous hemorrhages are caused by a retinal tear. Meanwhile, Lindgren et al. reported that from 95 patients with vitreous hemorrhage, the most common cause (29%) is vitreous detachment with retinal tear. The most frequent causes of vitreous hemorrhage are diabetic retinopathy, wet amd, and retinal vein occlusion. However, the prevalence in every study is different.^{2,3,6,7}

The vitreous hemorrhage is found most frequently in patients older than 80 years old due to neovascular age related macular degeneration (AMD) or retinal macroaneurysma. In this research, it was found that 35 (13.5%) patients were diagnosed with wet AMD. The age range of patient with the most common wet AMD is 61-70 years old.⁸

The retinal abnormalities causing the vitreous hemorrhage were not found in thirty-three patients (12.7%) in this research. The vitreous hemorrhage in patients was supposedly caused by PVD. PVD with or without retinal tear was the most common cause of vitreous hemorrhage in four of six studies of retrospective epidemiology about spontaneous vitreous hemorrhage. The spontaneous vitreous hemorrhage is a sign from PVD or it can appear during the process of PVD. In a population study, it is said difficult to evaluate the incident and prevalence of PVD with respect to the lack of clinical sign and clinical test which are not reliable. PVD, in general, emerges at the age of 45-65 years old. The retinal tear was found in 8-26% of patients with acute PVD in the initial examination. Patients with acute PVD in which the retinal tear was not found had the possibility of 2-5% that the tear was missed or the new tear will appear next week.^{7,9}

The fundusoscopic examination can help the diagnosis of vitreous hemorrhage when the hemorrhage is not dense. If there is a suspicion on a PVD, it is important to perform scleral indentation to exclude the possibility of retinal tear. Acute PVD with vitreous hemorrhage has incident of 70% of retinal tear, compared with the incident of 2-4% on acute PVD of retinal tear.⁴

In this research, 17 (6.5%) patients were diagnosed with retinal detachment rhegmatogen (RRD). Sarafizadeh et al. reported that in 48% (14/29) of patients at the age of below 80 years old, RRD was found, and from half of RRD

cases, proliferative vitreoretinopathy (PVR) was found. In another study, Yeung et al. stated that RRD with PVR complication was found in 33% of patients with dense vitreous hemorrhage.^{10,11}

USG examination is required to detect the retinal detachment or mass on the posterior segment when all retinal layers are not clearly visible as the consequence of vitreous hemorrhage. Some patients require serial USG examination every 7-10 days to ensure the diagnosis or to exclude the possibility of retinal tear and retinal detachment in which the immediate action is required.^{4,5}

Evaluation of fellow eye can also help diagnosis of vitreous hemorrhage. Condition on the fellow eye can help the diagnosis on eye with vitreous hemorrhage, such as the case of diabetic retinopathy, retinal tear, retinal detachment, and retinal vasculitis. In this research, bilateral vitreous hemorrhage was found in 27 patients (10.4%) in which in 26 patients (96.3%), the vitreous hemorrhage was caused by proliferative diabetic retinopathy, and in 1 patient (1.7%), it was caused by vasculitis.⁵

After determining etiology and source of vitreous hemorrhage, the management was adjusted individually. The choices of vitreous hemorrhage management are observation, laser photocoagulation, cryotherapy, and pars plana vitrectomy. The conservative (observation) therapy was not only determined by ultrasonography which shows the retina attached; the retinal tear was not found and there were no other causing lesions. The sensitivity of USG to detect retinal tear was between 44-56%. It can be concluded that around 50% of patients will have the risk RD and the loss of vision when they only get conservative therapy.^{4,12}

Proliferative diabetic retinopathy and PVD are two cases which are often discussed since management and choice of time for vitrectomy action are still controversy. In the proliferative diabetic retinopathy with vitreous hemorrhage, the indication of pars plana vitrectomy is when there is a severe vitreous hemorrhage which does not clear in 1-3 months or more. Vitrectomy can also be performed on vitreous hemorrhage which does not clear in 4-6 weeks on proliferative diabetic retinopathy which does not get previous therapy.^{3,8,13}

In this study, most of vitrectomy in diabetic retinopathy was performed in 1-3 months after the initial assessment of patients (55.8%). Meanwhile, 39 (30.2%) patients were treated with vitrectomy less than one month after their visit. Janelle et al. compared vitrectomy performed less than one month and more than one month on the management of vitreous hemorrhage on PDR. The study shows the result that immediate vitrectomy with endolaser shortens the time of visual loss of patient and reduces the need for additional PRP laser.¹⁴

In this research, on most of RRD cases (70.6%),

vitrectomy was performed less than one month. Vitreous hemorrhage with RRD suspicion required immediate vitrectomy action. Tan *et al.* and Dhingra *et al.* reported the result of study that early vitrectomy will reduce the possibility of retinal detachment by considering the final vision result which is better. Tan reported the result of early vitrectomy on 40 eyes with dense vitreous hemorrhage in which the cause was unknown. There was no patient diagnosed with retinal detachment before vitrectomy, but two patients with retinal detachment were found during operation. Retinal tear was found in 88% of the operated patients. Meanwhile, the median of final visual acuity in the study was 6/7.5.^{15,16}

CONCLUSION

The most common cause of retinal abnormality in patients with vitreous hemorrhage is proliferative diabetic retinopathy. Pars plana vitrectomy in the case of vitreous hemorrhage is performed in 1-3 months after the first visit of patients. In patients with proliferative diabetic retinopathy, most of the patients are treated with vitrectomy in 1-3 months. Meanwhile, in patients with RRD, vitrectomy is done less than one month.

In the case of vitreous hemorrhage, the fundoscopic examination of two eyes, USG, and systemic abnormalities will be very helpful in the process of diagnosing the cause. In the case of vitreous hemorrhage with suspicion of a retinal tear, retinal detachment, and proliferative diabetic retinopathy, it is important to consider the operative management earlier.

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