Surgical Management of Nondiabetic Vitreous Hemorrhage

APICHART SINGALAVANIJA, M.D.*, JUTALAI TANTERDTHAM, M.D.*,
CHAKRAPONG NAMATRA, M.D.*, ADISAK TRINAVARAT, M.D.*

Abstract

Sixty-one patients (62 eyes) with vitreous hemorrhage were studied. None were associated with diabetic retinopathy or perforating injuries and all required surgical treatment. The patients had dense vitreous hemorrhage with preoperative visual acuity of counting finger or worse in 55 eyes (88.7%). After the operation, a final visual acuity of 6/60 or better was found in 32 eyes (51.6%). The common causes of vitreous hemorrhage were subretinal neovascularization, blunt trauma, branch retinal vein occlusion, post-cataract extraction, retinal detachment with tears, and retinal vasculitis. There was no association between the postoperative visual outcome and either the preoperative visual acuity or the duration of vitreous hemorrhage. The pathological change at the macular area was the main factor which influenced the visual outcome.

Key word : Vitreous Hemorrhage, Vitrectomy, Vitreous, Surgery

Vitreous hemorrhage is one of many eye problems which cause visual disability. It is found in various conditions such as post-trauma, post-cataract extraction, retinal vascular disease with fibrovascular proliferation, retinal tear, retinal detachment, subretinal neovascularization, and may also occur idiopathically[1-7]. Pars plana vitrectomy is a standard surgical procedure for the treatment of non-clearing vitreous hemorrhage[8-10]. The postoperative visual outcome is usually good when there is no pathological change in the posterior pole of the retina. The purpose of this study was to determine the underlying causes of vitreous hemorrhage in nondiabetic patients who require surgical treatment, to evaluate the visual outcome, and to investigate which factors influence the visual outcome.

MATERIAL AND METHOD

We analyzed 61 patients who had vitrectomy for nondiabetic vitreous hemorrhage at Siriraj Hospital, Bangkok, between January 1990 and May 1997. There were 36 males and 25 females, with

* Department of Ophthalmology, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

ages ranging from 8 to 77 years (mean 46.8 years). Any patients with diabetic retinopathy and perforating eye injury were excluded from this study, because there are too many structural vitreous and retinal changes in these two conditions.

The duration of vitreous hemorrhage and any history of systemic disease were recorded. A general physical and eye examination was performed, and this included visual acuity, ocular tension, slit lamp biomicroscopy and funduscopy. Ultrasonography was done in 21 cases with dense vitreous hemorrhages. The patients were divided into 2 groups. Group 1 consisted of 29 patients with a known cause of vitreous hemorrhage and group 2 consisted of 32 patients where the cause of vitreous hemorrhage was not known prior to operation. The patients in the latter group had massive hemorrhages which obscured the view of fundus details.

Pars plana vitrectomy was performed on all 61 patients (62 eyes). Nine eyes received additional encircle scleral buckling and fluid gas exchange due to retinal tear and retinal detachment (Table 1).

Intraoperative pathological retinal changes, as well as intraoperative and postoperative complications, were recorded. The follow-up periods ranged from 3 to 24 months. The association between postoperative final visual acuity and factors such as the duration of vitreous hemorrhage, the preoperative visual acuity, and the macular involvement, were analyzed by the Chi-square test and Fisher's exact test.

RESULTS

This study included 62 eyes of 61 patients. One patient with Terson's syndrome had bilateral vitreous hemorrhage and required vitrectomy in both eyes. The duration of vitreous hemorrhage was less than one month in 11 eyes; 12 eyes had a duration of 1 to 3 months, 25 eyes between 3 and 6 months, and 14 eyes longer than 6 months (Table 2). Associated systemic diseases were hypertension, diabetes mellitus, chronic obstructive lung disease, tuberculosis, cardiac ischemia, systemic lupus erythematosus, aplastic anemia and syphilis (Table 3).

The commonest causes of vitreous hemorrhage in group 1 (those patients with a preoperative known cause) were blunt trauma, post-cataract extraction, Eale's disease, branch retinal vein occlusion, and vasculitis with fibrovascular proliferation. The common causes of vitreous hemorrhage in group 2 (those patients with preoperative unknown cause) were subretinal neovascularization from macular degeneration, branch retinal vein occlusion, retinal detachment with tear, and fibrovascular proliferation from vasculitis and hypertension. In seven cases the cause remained undetermined (Table 4). All of the patients in group 2 had dense vitreous hemorrhage before operation, and the cause of hemorrhage could usually be determined by fundus evaluation after blood removal.

The intraoperative complications were rebleeding, retinal tear, and lens injury. Postoperative complications were cataract, rebleeding, increased intraocular pressure, and proliferative vitreoretinopathy with retinal detachment (Table 5).

Table 1. Operative procedures.

Operation		Number of eyes
Pars plana vitrectomy		53
Pars plana vitrectomy	+ Encircle scleral buckling	5
Pars plana vitrectomy	+ Encircle scleral buckling + Fluid gas exchange	2
Pars plana vitrectomy	+ Fluid gas exchange	2

Table 2. Duration of vitreous hemorrhage.

Duration (months)	Number of eyes
< 1	11
1-3	12
> 3-6	25
> 6	14

Table 3. Associated systemic diseases.

Diseases	Number of cases
Hypertension	11
DM without retinopathy	2
Chronic obstructive pulmonary disease	2
Tuberculosis	2
Cardiac ischemia	1
Systemic lupus erythematosus	1
Aplastic anemia	1
Syphilis	1

Table 4. Causes of vitreous hemorrhage.

	Group 1 (known cause)	Group 2 (preop. unknown cause)	Total (no. of eyes)
Subretinal neovascularization	1	11	12
Blunt trauma	8	0	8
Branch vein occlusion	2	5	7
Post-cataract extraction	6	0	6
Retinal detachment with tear	1	4	5
Eales' disease	5	0	5
Vasculitis with fibrovascular proliferation	2	2	4
Hypertension with fibrovascular proliferation	1	2	3
Terson's syndrome	2	0	2
Central retinal vein occlusion	1	0	1
Aplastic anemia	1	0	1
Post YAG iridotomy	1	0	1
Unknown	0	7	7

Table 5. Operative complications.

Complications	No. of eyes
Intraoperative	
Rebleeding	16
Accidental retinal tear	4
Lens injury	1
Postoperative	
Cataract	4
Rebleeding	2
Increase intraocular pressure	2
Late proliferative vitreoretinopathy with retinal detachment	1

Table 6. Visual acuity before and after operation.

Visual acuity	Preoperative VA (no. of eyes)	Postoperative VA (no. of eyes)
Pl - Pj	9 (14.5%)	2 (3.2%)
Hm - Fc	46 (74.2%)	22 (35.5%)
1/60 - 6/60	3 (4.8%)	14 (22.6%)
6/36 - 6/18	3 (4.8%)	19 (30.6%)
6/12 - 6/6	1 (1.6%)	5 (8.1%)

Preoperative visual acuity ranging from light perception to counting finger was found in 55 eyes (88.7%). A postoperative final visual acuity in the same range was found in 24 eyes (38.7%) (Table 6). The poor visual outcome caused by pathological changes in the posterior pole of the retina and macular area, which included fibrous proliferation, involved disc and posterior pole in 11 eyes, subretinal membrane in 7 eyes, premacular membrane in 4 eyes, disciform scar at macula in 4 eyes, subretinal scar in 3 eyes, macular hole in 2 eyes, and lamellar macular hole in 1 eye. The postoperative final visual acuity of 6/60 or better was found in 32 eyes (51.6%).

The association between postoperative final visual acuity and factors that may influence the visual outcome such as preoperative visual acuity, duration of vitreous hemorrhage and macular involvement, was analyzed by the Chi-square test and by Fisher's exact test. The postoperative visual outcome (visual acuity 6/60 or better, and visual acuity worse than 6/60) showed no association with the preoperative visual acuity (visual acuity of counting finger or worse and visual acuity better than counting finger), or with the duration of vitreous hemorrhage (3 months or less and more than 3 months). The postoperative visual outcome showed a statistically significant association with the macular involvement ($p=0.022$, Table 7).

DISCUSSION

The most common cause of vitreous hemorrhage is proliferative diabetic retinopathy[1-5]. Other causes include vitreous detachment with or without retinal tears, retinal branch vein occlusion, vitreous hemorrhage during anterior segment surgery, and ocular trauma[1-5,9]. Vitreous hemorrhage occurs in various ways such as bleeding from retinal neovascularization, rupture of a normal vessel

Table 7. Analysis of postoperative visual acuity (<6/60, ≥6/60) and factors influencing the visual outcome.

Factor	No. of eyes		P value
	Postop.VA<6/60	Postop.VA≥6/60	
Preoperative VA			
VA ≤ Fc	29	26	0.104*
VA > Fc	1	6	
Duration of vitreous hemorhage			
≤ 3 months	11	12	0.845**
> 3 months	19	20	
Macular involvement			
Yes	20	11	0.022**
No	10	21	

* Fisher's exact test
** Chi-square test

caused by a retinal break, or posterior vitreous detachment with adherence of cortical vitreous to retinal vessels, and extension of subretinal hemorrhage through the retina into the vitreous(11).

The initial management of vitreous hemorrhage is conservative treatment and waiting to see if there is spontaneous clearing. Vitrectomy is usually delayed for at least 6 months. Surgical intervention may be indicated earlier in eyes with extremely dense vitreous hemorrhage, rubeosis iridis, hemolytic glaucoma, possible retinal detachment and possible amblyopia in a young patient(9). The surgery is usually successful especially in the presence of posterior vitreous detachment. However, in massive vitreous hemorrhage, surgical complications such as accidental retinal tear and lens injury may occur while performing vitrectomy(8,9).

In this study most of our patients (88.7%) had a dense vitreous hemorrhage with visual acuity of counting finger or worse. In sixty-three percent the hemorrhage had been present for more than three months. Half of the patients (50%) were in the group where the preoperative cause was unknown. After the operation we found that subretinal neovascularization, retinal branch vein occlusion, and retinal detachment with retinal tear, were the common causes in this group. The ten patients with subretinal neovascularization were between forty-nine and seventy-three years of age. We think that subretinal neovascularization occurs in elderly patients with pigmentary change at the macula and hard exudates caused by age related macular degeneration. Age related macular degeneration with subretinal neovascularization may lead to an extension of subretinal blood into the vitreous(11,12). In previous studies, the prevalence of vitreous hemorrhage in macular degeneration was 2-6 per cent(13-15). The time required for spontaneous clearing of the vitreous was on average 5.5 months and took as long as 9 years(15). The prognosis for eyes with vitreous hemorrhage secondary to age-related macular degeneration was poor(15-17). The poor visual outcome was due not only to the degeneration of the photoreceptor cells but also to the damage of the photoreceptors by subretinal blood clots and subretinal connective tissue formation(16-18).

Retinal vein occlusion accounts for 3.5-16 per cent of spontaneous vitreous hemorrhage(2,4). Vitreous hemorrhage is caused by bleeding from proliferative vessels. We found seven cases of branch retinal vein occlusion and one case of central retinal vein occlusion, all of which had fibrovascular proliferation. One case had a retinal tear and one case had a macular hole.

Vitreous hemorrhage resulting from retinal tear has been found to vary from 19.8-40 per cent (5-7). In the case of retinal tear and retinal detachment with massive vitreous hemorrhage, ultrasonography is helpful in detecting the retinal detachment and surgical management should be performed without delay. Other causes of vitreous hemorrhage were vasculitis and hypertensive retinopathy with vasoproliferation. The neovascularization in these conditions caused hemorrhage.

In the group of preoperative known causes, most of the patients had vitreous hemorrhage from iris root or ciliary body such as blunt trauma and post-cataract extraction. One case had a massive vitreous hemorrhage which occurred suddenly after YAG laser iridotomy. This was an uncommon occurrence. After the operation, the fundus showed normal macula but there was some residual subretinal hemorrhage and subretinal membrane at the posterior pole. We found that Eales' disease was one of the common causes of vitreous hemorrhage in younger patients in this group. Eales' disease presented with bilateral vitreous hemorrhage and periphlebitis. The inflammatory reaction of the vessel wall occluded the vessel lumen and produced areas of retinal ischemia. This process induced vasoproliferation that eventually bled and produced vitreous hemorrhage[19]. Vitrectomy was indicated in unresorbing vitreous hemorrhage[20].

In our series, 51.6 per cent of the patients had a postoperative final visual acuity of 6/60 or better. We found that pathological changes at the macula, such as preretinal or subretinal membrane, macular scar and macular hole formation, caused a poor visual outcome. When the postoperative final visual acuity (VA<6/60 and VA≥6/60) was compared with the preoperative visual acuity (VA ≤ Fc and VA>Fc) and the duration of vitreous hemorrhage (≤3 months and >3 months) there was no statistically significant association. However, the statistical analysis showed that the postoperative final visual acuity had an association with the macular involvement.

In conclusion, this study shows that pathological change at the macula is the main factor that influences the visual outcome in patients with massive vitreous hemorrhage who requires surgical treatment.

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การผ่าตัดรักษาภาวะเลือดออกในวิเทรียสซึ่งมิได้มีสาเหตุจากเบาหวาน

อภิชาติ สิงคาลวณิช, พ.บ., จุฑาไล ตันฑเทอดธรรม, พ.บ.*, จักรพงศ์ นะมาตร์, พ.บ.*, อดิศักดิ์ ตรีนวรัตน์, พ.บ.**

คณะผู้รายงานได้ทำการศึกษาผู้ป่วย 61 ราย (62 ตา) ซึ่งมีเลือดออกในวิเทรียส โดยมิได้มีสาเหตุจากโรคเบาหวานที่จอประสาทตาหรือบาดแผลทะลุนัยน์ตา ที่มารับการรักษาโดยการผ่าตัดวิเทรียส ผู้ป่วยร้อยละ 88.7 มีระดับสายตาก่อนผ่าตัด เห็นเพียงนับนิ้วได้หรือเห็นน้อยกว่านับนิ้ว หลังผ่าตัดพบว่าผู้ป่วยร้อยละ 51.6 มีระดับสายตา 6/60 หรือดีกว่า สาเหตุของเลือดออกในวิเทรียสที่พบบ่อย คือ เกิดจากเส้นเลือดผิดปกติใต้ชั้นจอประสาทตา อุบัติเหตุชนิดที่ไม่มีแผลทะลุหลอดเลือดดำที่จอประสาทตาอุดตัน เกิดภายหลังผ่าตัดต้อกระจก จอประสาทตาฉีกขาดและจอประสาทตาลอก มีการอักเสบของเส้นเลือดที่จอประสาทตา จากการศึกษาพบว่าระดับสายตาหลังผ่าตัดมิได้มีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับระดับสายตาก่อนผ่าตัดหรือระยะเวลาที่มีเลือดออกในวิเทรียส การเกิดพยาธิสภาพที่มาคูลาเป็นปัจจัยสำคัญที่มีผลต่อการมองเห็นหลังผ่าตัด

คำสำคัญ : วิเทรียส, เลือดออกในวิเทรียส, การผ่าตัดวิเทรียส

* ภาควิชาจักษุวิทยา, คณะแพทยศาสตร์ศิริราชพยาบาล, มหาวิทยาลัยมหิดล, กรุงเทพ ฯ 10700