

Narendra Dhingra
Ian Pearce
David Wong

Early vitrectomy for fundus-obscuring dense vitreous haemorrhage from presumptive retinal tears

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N. Dhingra (✉)
Cardiff Eye Unit,
University Hospital of Wales,
Cardiff, UK
e-mail: ndhingra@doctors.org.uk
Tel.: +44-29-20614850
Fax: +44-29-20748300

I. Pearce · D. Wong
Vitreoretinal Services,
St Paul's Eye Unit,
Royal Liverpool University Hospital,
Liverpool, UK

Abstract *Background:* Published literature on the management of patients with fundus-obscuring dense vitreous haemorrhage due to presumptive retinal tears is sparse and advocates waiting for spontaneous resolution. Surgery is indicated only when a definite retinal tear or retinal detachment is identified. *Methods:* A retrospective review of all patients who underwent early vitrectomy for vitreous haemorrhage associated with posterior vitreous detachment was carried out. A comparison of initial visual acuity versus final visual acuity after vitrectomy was performed. The number of eyes that were found to have retinal tears and retinal detachment were documented. Initial and final Snellen acuities were used for statistical analysis. Categorical data were analysed using Fisher's exact test and statistical significance was considered to be $p < 0.05$. *Results:* Sixteen eyes were identified and all these patients presented or were referred soon after the onset of vitreous haemorrhage. Associated ocular pathology (choroidal neovascular membrane, retinal branch vein occlu-

sion, macroaneurysm) was suspected to be the source of the haemorrhage in 4 eyes. Vitrectomy was carried out in 12 eyes soon after presentation (mean time 6.3 days, range 1–28 days). Nineteen retinal breaks were seen in these eyes and 5 eyes had more than two breaks. None of the eyes were found to have proliferative vitreoretinopathy at the time of surgery. Two eyes needed repeat surgery for new retinal breaks. Excluding the eyes found to have an ocular pathology as the cause of vitreous haemorrhage, the mean visual acuity improved from hand movements to 6/12 ($p < 0.001$). *Conclusions:* Early vitrectomy for spontaneous dense fundus-obscuring vitreous haemorrhage and posterior vitreous detachment is safe. Since the number of patients in this study was small, a prospective randomised controlled study comparing early versus late vitrectomy is needed to see whether early surgery also prevents proliferative vitreoretinopathy formation.

Keywords Early vitrectomy · Retinal tears · Vitreous haemorrhage

Introduction

In the setting of acute posterior vitreous detachment (PVD) with vitreous haemorrhage (VH), the reported incidence of retinal tears is between 20 and 100% [2, 3, 6, 8, 12, 14, 18]

(Table 1). The haemorrhage is normally minimal, insignificant and does not obscure fundal details. However, in patients presenting with fundus-obscuring VH, the presence of a retinal break cannot be ruled out. These cases are managed conservatively, allowing for spontaneous resolu-

tion of VH. Surgery is indicated once a definite retinal tear or detachment is detected or if the haemorrhage fails to clear spontaneously after a waiting period.

Delayed surgery in these patients with dense VH and PVD can be associated with poor visual outcome due to proliferative vitreoretinopathy (PVR). At our unit, we have been performing early vitrectomy in these eyes, irrespective of B-scan findings. The aim of this paper is to present our results and to review the literature on the current management of these patients.

Materials and methods

A retrospective case notes review of all the patients who underwent vitrectomy between January and December 2003 was undertaken. Of the 650 vitrectomies performed, 16 patients with an initial diagnosis of spontaneous non-traumatic dense VH were identified. Patients with a history of diabetic retinopathy who had received photocoagulation and complicated cataract surgery were excluded.

All the patients had undergone a B-scan to look for the presence of PVD, retinal detachment or retinal breaks. Pars plana vitrectomy was performed immediately after presentation, irrespective of B-scan findings.

The pre-operative data recorded from the notes were age, sex, duration of symptoms, history of previous ocular surgery, Snellen visual acuity, refractive error, phakic/pseudophakic, history of diabetes, hypertension or warfarin intake, B-scan findings and timing of vitrectomy. The per-operative data recorded included the number and location of retinal breaks, presence of retinal detachment, surgical management employed, PVR, complications of surgery, visual acuity at last follow-up and the cause of VH.

For statistical analysis, hand movement vision was assigned a Snellen equivalent of 6/6,000. The data were analysed using SPSS for Windows and statistical significance was considered to be $p < 0.05$.

Results

Of the 16 eyes that presented with spontaneous dense VH, there were 9 males and 7 females. The mean age was 63 years (range 48–81 years). The visual acuity at presentation ranged from hand movements to 6/60. One patient with VH and dispersed blood in the vitreous gel had a visual acuity of 6/12. The fundal view in this patient was poor and retinal detachment was suspected clinically. Only 1 patient had a past history of flashing light sensation.

In 12 patients, there was no prior ophthalmic history while 4 patients had an underlying ocular disease (age-related macular degeneration [ARMD] in 2, branch vein occlusion [BVO] in 1, retinal macroaneurysm in 1). Patients presumed to have VH with presumptive retinal tears ($n=12$) were referred early (mean time 14.3 days after the onset of symptoms) and patients with underlying pathology ($n=4$) were referred late (1–5 months).

Fourteen patients were phakic, 2 were pseudophakic, 2 had a history of high myopia and 1 eye had undergone argon laser retinopathy for a retinal tear prior to the onset of VH. B-scans showed the presence of PVD in all the eyes and retinal detachment in 3 eyes. Retinal tears could not be detected in any of the eyes.

Twelve eyes (75%) underwent vitrectomy at a mean duration of 6.3 days (range 1–28 days). Two eyes with ARMD underwent vitrectomy at 5 months and the other 2 patients had surgery at 1 month from the onset of VH. The follow-up ranged from 2 to 18 months, with a mean of 9 months.

Of the 12 eyes, 9 eyes (75%) had one retinal break and 5 eyes had more than two retinal breaks. There were 19 breaks in 9 eyes (mean 2.1 per eye, range 1–4). Most of the breaks were in the superotemporal quadrant (73.6%). Three patients were found to have retinal detachment (RD) at the time of surgery. Vitrectomy, endolaser and cryo were used in most of the patients. Silicone oil injection was used in 1 patient and none of the patients needed scleral buckling. Eleven patients were found to have PVD as the sole cause of VH and 1 patient was found to have an underlying BVO. None of the patients were found to have PVR at the time of surgery. The final visual acuity recorded in these 12 patients was better than 6/18 ($p < 0.001$). Two patients needed repeat vitrectomy, 1 for an entry site hole and 1 for a new break. Both these patients achieved a final visual acuity of 6/9. One patient had an accidental lens touch during vitrectomy and needed cataract surgery. This patient achieved a final visual acuity of 6/12.

Of the other 4 eyes, 2 were found to have choroidal neovascular membrane (CNVM) with extensive subretinal haemorrhage, 1 had BVO with retinal neovascularisation and 1 had a macroaneurysm as the source of VH. The 2 eyes with CNVM achieved a poor final visual acuity of hand movements only. The eye with BVO was additionally found to have a retinal tear at the time of surgery. The eye with a macroaneurysm achieved a final visual acuity of 6/36.

Table 1 Incidence of retinal breaks (RB) and vitreous haemorrhage (VH) with acute posterior vitreous detachment (PVD)

Study	PVD with VH (%)	PVD with RB and VH (%)
Jaffe [6]	15	100
Kanski [8]	41	64
Tabotabo et al. [18]	18	100
Novak and Welch [14]	16	79
Boldrey [2]	15	62
Murakami et al. [12]	18	77
Byer [3]	6	20

Discussion

In an eye with PVD and dense VH, the presence of a retinal tear cannot easily be ruled out. Bed rest with sedation, restriction of physical activity and binocular patching have been suggested to allow the blood to gravitate down so the superior retina can be examined. VH limited to the retrohyaloid space can clear, while VH involving the gel fails to clear with patching [10].

B-scan evaluation of retinal tears with dense spontaneous VH

B-scanning is well established as an investigation of choice in evaluating vitreo-retinal anatomy in the presence of VH. Its use in detecting large and giant retinal tears is well documented [7], but in patients with small or multiple breaks its use in serially following-up patients cannot be relied upon. Published studies on B-scanning have shown that small to moderate retinal tears can be detected in about 44–91% [5, 13, 15] and it helps to study vitreo-retinal anatomy. However, its inability to detect multiple retinal breaks and being operator dependent does not make it an ideal tool in the serial following-up of these patients. Also, the presence of dense VH in an eye with an open retinal break leads to an increase in vitreous serum concentration and break down of the blood–retina barrier that allows PVR to set in [1, 4]. Therefore, in a patient with a history of spontaneous non-clearing VH, where a retinal tear cannot be ruled out, a case for early surgery exists.

Surgical management

Surgery in these patients with dense fundus-obscuring VH is performed when a definite retinal tear or retinal detachment is seen, or if the haemorrhage fails to clear spontaneously after a waiting period, sometimes up to 3 months. With 67% of such eyes having retinal tears and 39% retinal detachment [11], delayed management can be associated with adverse visual outcome.

In a study of 10 patients with non-traumatic VH obscuring fundal details [17], it took an average of 4.3 days for the VH to clear so that the retinal tears could be examined. All the tears were in the superior quadrant and no additional tears were found after total clearance of VH. It took an additional 4–8 weeks for the vitreous cavity to clear completely to allow visualisation of the whole of the retina. Two patients developed PVR and had poor visual outcome.

In a retrospective study by Katsumi et al. [9], 14 patients with spontaneous massive VH underwent vitrectomy and scleral buckling. The mean time from the onset of haemorrhage to surgery available in 13 cases was 65.8 days (range 7–140 days). Nine of the 11 patients with retinal detachment had a final vision of hand movements or counting fingers. The cause of poor visual outcome was again PVR.

In a large study by Sarrafzadeh et al. [16], 36 patients with PVD and VH obscuring the visualisation of the fundus were included. There were 24 eyes that were found to have at least one retinal break and the mean number of breaks per eye was 1.7. Most of the retinal breaks were located superiorly and 14 eyes developed retinal detachment by 15 days (range 4–35 days). In only 8 eyes did the VH clear up without any surgical intervention between 23 and 47 days (mean time to clearance 32 days). Patients with PVR formation (19%) and macula-off RD had a poorer visual outcome than patients with macula-on detachment with no evidence of PVR. Significantly, eyes with PVR underwent surgery more than 3 weeks after initial presentation.

From this literature review, no clear conclusions regarding management can be drawn. It is difficult to directly compare the results of one study with another. The problem lies in quantifying the density of VH. In most of the series, no special attention is paid to the location of the haemorrhage within the vitreous cavity and the most common reason for poor visual outcome is PVR.

Our results show that early vitrectomy in patients with PVD as the sole cause of fundus-obscuring dense VH is safe, in these eyes with good visual potential (Table 2). However, the patients should be warned of possible complications associated with vitrectomy. Since the number of patients in this study was small, a prospective

Table 2 Outcome of patients presenting with fundus-obscuring vitreous haemorrhage due to retinal tears. RD retinal detachment, PVR proliferative vitreoretinopathy

Study	<i>n</i>	Retinal breaks	RD	PVR (%)	Management
Seelenfreund et al. [17]	10	10	0	20	360° implant
Katsumi et al. [9]	14	14	11	Not mentioned	Vitrectomy and buckling
Sarrafzadeh et al. [16]	36 ^a	24 (>1 tear in 11)	14	19.4	Surgery in 28 eyes ^c
Our results	16 ^b	18 (>1 tear in 5)	3	0	Vitrectomy

^a32 with PVD and 4 with vitreous haemorrhage due to other causes

^b12 eyes with PVD and 4 eyes with vitreous haemorrhage due to other causes

^c14 eyes with vitrectomy and buckle for RD and 14 eyes with vitrectomy only for non-clearing vitreous haemorrhage

randomised controlled study comparing early versus late vitrectomy is needed to see whether early surgery also prevents PVR formation. In patients with suspected ocular pathology, early surgery allows the fundal pathology causing the haemorrhage to be correctly identified.

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