

Ultrasound Findings in Vitreous Hemorrhage

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Abstract

Background: Vitreous hemorrhage is a frequent cause of consultation in ophthalmic emergencies. The appropriate approach to patients, considering their antecedents and comorbidities added to the performance of ocular ultrasound, are the fundamental pillars in the search for the cause.

Objective: To characterize the clinical and ultrasound findings of patients which assist the ophthalmological emergency service with vitreous hemorrhage. as well as analyzing the comorbidities and severity in each patient.

Study design: Observational retrospective descriptive study.

Method: A retrospective review of medical records was carried out from March 2019 to March 2020, of 91 patients attended in the ophthalmological emergency service of the San Ignacio University Hospital, with a diagnosis of vitreous hemorrhage and who underwent ocular ultrasound.

Results: The presence of vitreous hemorrhage was more frequent in men than women, the average age in the analyzed population was 56 years. Nontraumatic vitreous hemorrhage occurred in 83.5% of patients. The most frequent ultrasound findings in nontraumatic vitreous hemorrhage was retinal tear (42.3%).

Conclusion: Ocular ultrasound is a useful tool in the ophthalmology emergency department in patients with vitreous hemorrhage identifying entities that in most cases require early intervention.

Keywords: Vitreous Hemorrhage; Ocular Ultrasound; Retinal Detachment; Posterior Vitreous Detachment; Retina

Introduction

Vitreous hemorrhage is a relatively common cause of acute vision loss, with an incidence of approximately 7 cases per 100,000 population [1]. It is defined as the presence of extravasated blood within the space bounded by the inner limiting membrane of the retina in the posterior and lateral aspect, the ciliary body laterally, the zonular fibers of the lens and the posterior lens capsule at the anterior limit [1,2]. The causes associated with the presence of vitreous hemorrhage may be variable depending on the population analyzed, however, the most reported in the literature are: associated complications of diabetic retinopathy, posterior vitreous detachment, retinal tear, retinal detachment, retinal microaneurysm, venous vascular occlusion and ocular trauma [2,3,4]. Many of these entities require early intervention in order to avoid complications. In this sense, ocular ultrasound in the ophthalmologic emergency department may represent

a valuable and easily accessible tool for the early detection of the causes of vitreous hemorrhage⁵. In the present study, we evaluated the ultrasound findings of patients presenting to the emergency department with vitreous hemorrhage, as well as analyzing the comorbidities and severity of vitreous hemorrhage.

Materials and Methods

Design and sample

A retrospective observational study was conducted, taking into account the medical records of 91 patients who presented to the ophthalmologic emergency department of the Hospital Universitario San Ignacio in Bogotá during the period from March 2019 to March 2020 with vitreous hemorrhage and who underwent ocular ultrasound. All assessments were performed with the same ultrasound equipment and were carried out by the same ocular ultrasound expert examiner. The variables of age, sex, comorbidities, visual acuity at the time of diagnosis and degree of severity of the hemorrhage were also analyzed.

Results and Discussion

A review of medical records of patients who attended the ophthalmology unit of the San Ignacio Hospital in Bogota between March 2019 and March 2020 was performed, taking as inclusion criteria the diagnosis of vitreous hemorrhage and the performance of ocular ultrasound. A sample of 91 patients was obtained, of which 64.8% were men and 35.2% women (Table 1). The patients’ ages ranged from 9 to 87 years, with a mean of 56 years (Males 59 years, Females 52 years). Age group distribution was as follows: under 10 years (1.1%), 10 to 20 years (4.3%), 21 to 30 years (4.3%), 31 to 40 years (7.6%), 41 to 50 years (6.5%), 51 to 60 years (31.5%) and over 60 years (44.6%). The comorbidities present in the population analyzed were: arterial hypertension (56.2%), diabetes mellitus (41.6%), no comorbidity (29.6%), anticoagulation (13.5%), hematological alterations (acute myeloid leukemia, chronic myeloid leukemia, medullary aplasia, multiple myeloma) (4.4%), chronic kidney disease (1.1%) and obesity (1.1%) (See Table 1). The time of evolution from the onset of symptoms had a mean of 13 days, with a distribution by groups of: 1 day of evolution (12%), 2 to 10 days (52.2%), 11 to 20 days (17.4%), 21 to 30 days (9.8%) and more than 30 days (8.7%). Regarding best corrected visual acuity (BCVA) at the time of diagnosis, 52.7% had vision of hand movement (HM) and counting fingers (CF), 12.3% of patients had vision of 20/400 and the remaining 35% had BCVA better than 20/400.

Men	64.8% (59) (n)
Women	43.8% (32) (n)
Comorbidities	
Arterial Hypertension	56.2%
Diabetes	41.6%
Anticoagulation	13.5%
Hematologic alterations	4.4%
Chronic Renal Insufficiency	1.1%
Obesity	1.1%
None	29.6%
Vitreous hemorrhage severity	
Mild	24.2%
Moderate	24.2%
Severe	48.4%

Table 1: Population characteristics.

Hemorrhage severity was classified according to funduscopy findings as follows: mild (24.2%) when it allows evaluation of the entire fundus including details; moderate (24.2%) when it allows seeing the fundus but not evaluating details or some areas of the retina; severe (51.6%) when no retina or presence of retinal red is observed. Patients were classified into two groups according to the etiology of vitreous hemorrhage. The first group included patients with traumatic vitreous hemorrhage (16.5%) and the other group included those with non-traumatic vitreous hemorrhage (83.5%) (Table 2). The sonographic findings in patients with traumatic vitreous hemorrhage were as follows: retinal tear (64.3%), retinal detachment (50%), partial posterior vitreous detachment (50%), vitreoretinal traction (14.3%), traumatic lens detachment-luxation (14.3%), choroidal detachment (14.3%) and total posterior vitreous detachment (total PVD) (7.1%). As for non-traumatic vitreous hemorrhage the distribution of ultrasound findings was as follows: retinal tear (42.3%), partial posterior vitreous detachment (38.5%), tractional retinal detachment (29.5%), total PVD (26.9%), retinal detachment (RD) (20.5%), macular edema (10.3%), retro vitreous hemorrhage (9%), sublimiting internal membrane hemorrhage (1.3%), and choroidal detachment (1.3%).

Non traumatic Vitreous hemorrhage	83.5% (76) (n)
Retinal tear	42.3%
Partial posterior vitreous detachment	38.5%
Tractional retina detachment	29.5%
Total posterior vitreous detachment	26.9%
rhegmatogenous retinal detachment	20.5%
Macular edema	10.3%
Retro vitreous hemorrhage	9%
Sublimiting internal membrane hemorrhage	1.3%
choroidal detachment	1.3%
Hemorragia vítrea Traumática	16.5% (15) (n)
Retinal tear	64.3%
Partial posterior vitreous detachment	50%
Lens luxation	14.3%
Choroidal detachment	14.3%
Total posterior vitreous detachment	7.1

Table 2: Ultrasound findings in patients with vitreous hemorrhage.

Likewise, there were causes of vitreous hemorrhage not detected in ocular ultrasound and that were only diagnosed at the time of performing posterior vitrectomy, which were: retinal venous occlusion (7.7%) and retinal macroaneurysm (1.1%). As for treatment, 70.1% of patients required some type of emergency intervention, 61.3% of them underwent posterior vitrectomy (61.3%) while 8.8% received management with laser photocoagulation.

The most frequent sonographic findings in patients with traumatic and nontraumatic vitreous hemorrhage were also analyzed. The latter included retinal tear, partial posterior vitreous detachment, tractional retinal detachment and total posterior vitreous detachment. In accordance with Lean., *et al.*, which founded that the most frequent causes of vitreous hemorrhage were indeed retinal tear followed by ocular trauma [6]. Similarly, Lindgren., *et al.* in their study that included 95 patients with dense vitreous hemorrhage showed that the main causes were posterior vitreous detachment with or without retinal tear, proliferative diabetic retinopathy and venous vascular occlusions [2].

We propose that patients with vitreous hemorrhage should be approached with an adequate evaluation of their history and comorbidities [7]. In the present study, less than 50% of patients had diabetes as an associated comorbidity from which diabetic retinopathy was evident in only 29.5% of the patients being the third cause of nontraumatic hemorrhage in our series. This is in discrepancy with the findings of Mohamad-Reza, *et al.* and Rabinowitz, *et al.* who in their respective publications found that diabetic retinopathy was the main cause of vitreous hemorrhage [3,8]. Likewise, in the present study only 7.7% of the patients evaluated presented retinal venous occlusion, compared to the 43.8% found by Kim, *et al.* in their study of 169 patients with vitreous hemorrhage [9]. The above mentioned taking into account the low prevalence of comorbidities.

As previously mentioned, it was evidenced that retinal tear is indeed the main cause of vitreous hemorrhage. Similarly, a high proportion of patients were documented to have either total or partial PVD. It should be noted that 48% of the population studied had severe hemorrhage at the time of evaluation. This is related to the findings of Sandinha, *et al.* in their publications in which they determine that Posterior vitreous detachment in the presence of dense hemorrhage is associated in 70% of cases with ultrasound findings of retinal tear [10].

On the other hand, Vote Bj, *et al.* in their study found a 39% incidence of rhegmatogenous detachment in patients with severe vitreous hemorrhage [7]. This finding was identified in 50% of the patients with non-traumatic vitreous hemorrhage evaluated in the present study. Likewise, Kuzmanovic, *et al.* state that 50% of retinal tears, in the absence of treatment, will lead to rhegmatogenous detachment [11], a not negligible cause of retinal hemorrhage in the present study (20.5% of patients with non-traumatic hemorrhage).

This findings highlight the need for an appropriate diagnosis by ocular ultrasound. This, taking into account that it is the only tool capable of assessing the posterior segment in the presence of severe hemorrhage [10]. Kuzmanović, *et al.* reported a sensitivity of 100% and specificity of 92% for the detection of retinal tear by ocular ultrasound in patients with acute posterior vitreous detachment and vitreous hemorrhage [11]. Sandinha, *et al.* reported a sensitivity and specificity of 100% for the detection of retinal detachment by ocular ultrasound [10].

The present study shows that vitreous hemorrhage is associated with clinical entities that require early intervention in most cases to prevent irreversible visual complications. Of the population analyzed in our study 70.1% of the patients required some type of early intervention, divided between posterior vitrectomy (61.3%) and laser photocoagulation (8.8%). A study published by Dhingra, *et al.* demonstrated the effectiveness and safety of early vitrectomy in 12 patients with dense vitreous hemorrhage in whom retinal tears were diagnosed [12]. Tan, *et al.* reported the results of early vitrectomy in 40 patients with vitreous hemorrhage and retinal tears [13]. They concluded that in cases in which the density of the hemorrhage does not allow laser photocoagulation, early vitrectomy is a safe procedure and aims to prevent complications such as rhegmatogenous detachment and vitreoretinal proliferation [13]. These results suggest that a conservative strategy while waiting for vitreous hemorrhage to be reabsorbed is not the management of choice in severe hemorrhage [10]. Furthermore, in patients with severe vitreous hemorrhage without additional findings, continuous monitoring by serial ultrasonography is required [7].

Conclusions

In conclusion, the use of ocular ultrasound in the ophthalmologic emergency department in patients with vitreous hemorrhage allows us to detect potentially serious clinical entities such as the presence of retinal tear, rhegmatogenous detachment and tractional retinal detachment. Timely diagnosis in our study showed that it allows early treatment, aiming to reduce irreversible visual complications.

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Conflict of Interest

The authors declare there is no conflict of interest.

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