



# Use of PPV (23G) in a 55-year-old patient with high myopia 23 days after phacoemulsification complicated by suprachoroidal hemorrhage

Original Study

Dawid Woszczek<sup>1\*</sup>, Sebastian Sirek<sup>2,3</sup>, Tomasz Wilczyński<sup>2</sup>, Dorota Wyględowska-Promieńska<sup>2,3</sup>

<sup>1</sup>Students' Scientific Society, Department of Ophthalmology, Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland

<sup>2</sup>Department of Ophthalmology, University Clinical Center. Prof. Kornel Gibirski, Medical University of Silesia in Katowice

<sup>3</sup>Department of Ophthalmology, Faculty of Medical Sciences in Katowice, Medical University of Silesia, Katowice, Poland

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## Abstract

**Introduction.** Suprachoroidal hemorrhage (SCH) is a severe complication that can arise both during and after ophthalmic procedures. The occurrence rate during cataract phacoemulsification surgery ranges from 0.03% to 0.13%. This condition is caused by damage to the posterior long or short ciliary artery, leading to blood accumulation in the area between the choroid and sclera. Risk factors for SCH include intraocular surgeries, older age, glaucoma, and myopia.

**Materials and Methods.** A 55-year-old female patient presented to the Ophthalmology Outpatient Clinic with SCH and hemorrhagic retinal detachment of the left eye (OS) resulting from phacoemulsification cataract surgery with high degenerative myopia. The visual acuity (VA) of the OS before vitrectomy (PPV) was at 0.001, and the intraocular pressure (IOP) in the OS was 20 mmHg. After the additional examinations, the patient was qualified for PPV. PPV was performed from a posterior access, mAndo iridotomy, decalin was administered, subretinal and subconjunctival blood was partially evacuated, retinal endolaser was performed, decalin was removed, and OS silicone oil endotamponade was performed.

**Results.** At the first follow-up 7 days after PPV, the VA of the OS was 0.06, and the IOP value in the OS was 14 mmHg. B-projection ultrasound showed dense silicone oil echoes, and the retina appeared adherent. At follow-up after 1 and 3 months, VA was at 0.1 and 0.7 respectively, and IOP in the OS was 14 mmHg.

**Conclusions.** Despite the difficulties associated with high myopia and extensive SCH, the PPV procedure proved to be extremely effective for achieving satisfactory visual acuity and restoring correct anatomical conditions.

## Keywords

vitrectomy • suprachoroidal hemorrhage • cataract phacoemulsification • retinal degenerative myopia

## 1. Introduction

Suprachoroidal hemorrhage (SCH) is a severe complication that can arise both during and after ophthalmic procedures. It results from damage to the posterior long or short ciliary artery, leading to blood accumulation in the area between the choroid and sclera. This condition can lead to permanent vision loss, making prompt diagnosis and treatment crucial. SCH can be triggered by surgical trauma to blood vessels or by anatomical factors, such as severe degenerative myopia, which heightens the risk of developing this complication [1,2].

Epidemiological studies indicate that suprachoroidal hemorrhage occurs in 0.03% - 0.13% of phacoemulsification cases and can be associated with a serious risk of vision loss [3,4]. Each stage of phacoemulsification carries a risk of suprachoroidal hemorrhage, but this complication most often occurs before implantation of the artificial lens, as this is when the eye is at its softest. The source of the hemorrhage is damage to the posterior long ciliary vessels caused by the phenomenon of micro-cutting between the choroid and the sclera [5]. This risk may be increased in patients with comorbidities such as diabetes, hypertension, or coagulation disorders. Patients who have undergone intraocular

surgery, especially cataract phacoemulsification and PPV, are particularly at risk. When SCH occurs, prompt management is key. Treatment usually includes surgical intervention to decompress the suprachoroidal space. In addition, it is important to monitor the patient's condition and identify possible risk factors that may lead to worsening of the situation, such as an increase in IOP or changes in the patient's general condition [6].

The aim of this study is to evaluate the effectiveness of PPV surgery as a treatment for complications such as suprachoroidal hemorrhage to achieve satisfactory visual acuity and restore correct anatomical conditions. As the number of cataract surgeries rises and myopia becomes more prevalent in the population, it is increasingly important to assess the effectiveness of addressing this complication to enhance visual acuity and the quality of life for patients.

## 2. Materials and methods

### 2.1. Patient data

A 55-year-old woman presented to the Ophthalmology Outpatient Clinic of the Prof. K. Gibirski University Clinical Center of the Silesian Medical University in Katowice, Poland,

\* E-mail: dawidwoszczek@gmail.com



with SCH and hemorrhagic OS retinal detachment, which developed during cataract phacoemulsification surgery with high degenerative myopia. During admission, a B-projection ultrasound was performed, which showed massive formations of separated choroid forming a “kissing choroidal sign” and dense echoes of extravasated blood in the choroidal space (Fig. 1).

VA before surgery was at 0.001, and IOP was 20 mmHg. The patient had a history of 2-fold cerebrovascular incidents in 2009 and 2013 and type 2 diabetes mellitus since 2021 treated with oral medications; the patient is permanently taking Acidum acetylsalicylicum in a daily dose of 150 mg. After analyzing the local condition and performing additional tests, the patient was qualified for a PPV procedure (23 G).

## 2.2. Description of the procedure

The patient was anesthetized by performing a periocular injection (2% lignocaine solution and 0.5% bupivacaine solution in a 1:1 ratio). Based on the ultrasound image in the B projection of the left eyeball, an infusion was placed at the site of the uveal membrane that adhered to the sclera. The remaining trocars were placed at the typical site. Central and peripheral PPV was performed. The eye was then filled with PFCL. An external lateral transconjunctival incision was made, 8mm from the corneal stroma with a calibrated knife (20G). An 8/0 absorbable suture was placed over the wound, and the sclerotomy was unsealed by splitting its edges. The IOP was gradually increased, periodically up to 60 mmHg; the eyeball was massaged; and the blood was evacuated from the suprachoroidal space. Decompression was performed to an extent sufficient to expose the macular area. After checking that the retina was adherent and the choroidal blisters had decreased, direct replacement of the PFCL with silicone oil was performed (Fig. 2).

## 2.3. Follow-up

At follow-up 7 days after the PPV procedure, the VA OS was at 0.06, and the IOP was 14 mmHg. During the next follow-ups 1 and 3 months after the PPV procedure, there was a significant improvement in the VA value at 0.1 and 0.7, respectively (Fig. 3). The IOP value remained stable at 14 mmHg during the subsequent follow-ups. 3 months after the procedure, a color fundus photo of the OS was taken that showed the reconstructed anatomical structure of the retina (Fig. 4). Postoperative ocular biometry was 31.44mm for the right eye (OD) and 33.18mm for the OS. Postoperative refraction was -1.75/-1.0 ax 12 for the OS, and refraction for the OD was -3.0/-0.5 ax 137. Optical coherence tomography (OCT) imaging performed 5 months after surgery showed a significant degree of retinal thinning with preservation of the layered structure (Fig. 5).

Limitations of our work are a limited sample size, a follow-up of 5 months, and a lack of differentiation in the timing of conducting the surgical procedure.

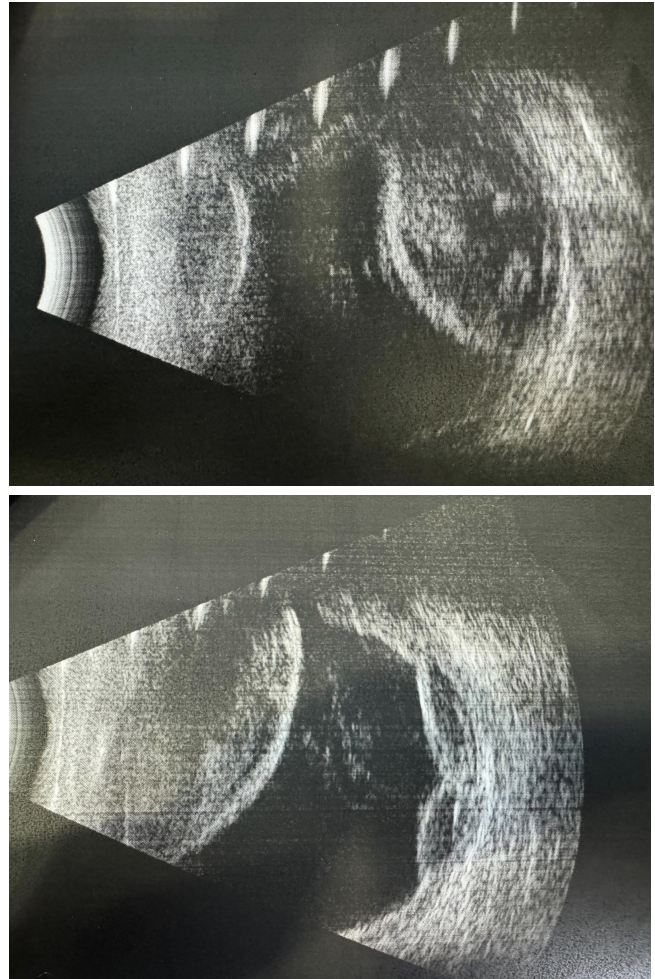


Figure 1. B-projection ultrasound image of the OS, massive formations of the separated choroid, the so-called “kissing choroidal sign”

## 3. Discussion

### 3.1. When is the right time for the surgical procedure?

The existing literature shows no clear consensus on the optimal timing for decompressive surgery in cases of SCH [7]. Some experts recommend waiting 10-14 days for the clot to liquefy, as this allows for effective evacuation after the suprascleral blood undergoes hemolysis [8,9]. Subsequent research suggests that surgical intervention should occur within 14 days of SCH onset for the best outcomes [9-11]. Delaying surgery beyond this period has been linked to poorer visual results for patients [11].

Allowing the hemorrhage to resolve naturally can lead to retinal detachment in cases of vitreous entrapment, potentially resulting in suboptimal visual acuity. In severe cases of hemorrhage, if surgery is delayed, the risk of eyeball atrophy or loss increases. Early surgical intervention can offer the best chance of preserving useful vision [10,12]. However, some studies indicate that performing surgery too soon, within 3 days of the

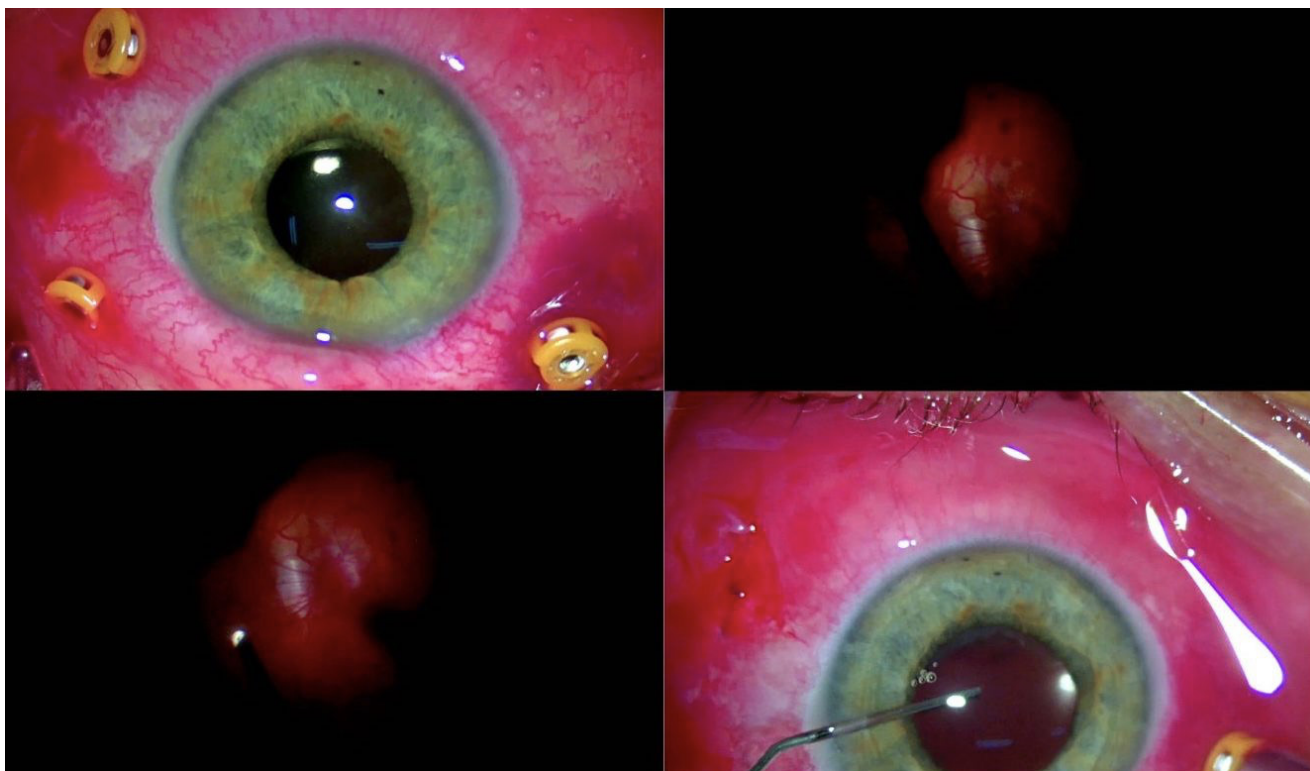


Figure 2. PPV (23G) OS with mAndo iridotomy, partial evacuation of subretinal and subretinal blood, retinal endolaser, PFCL removal and silicone oil endotamponade

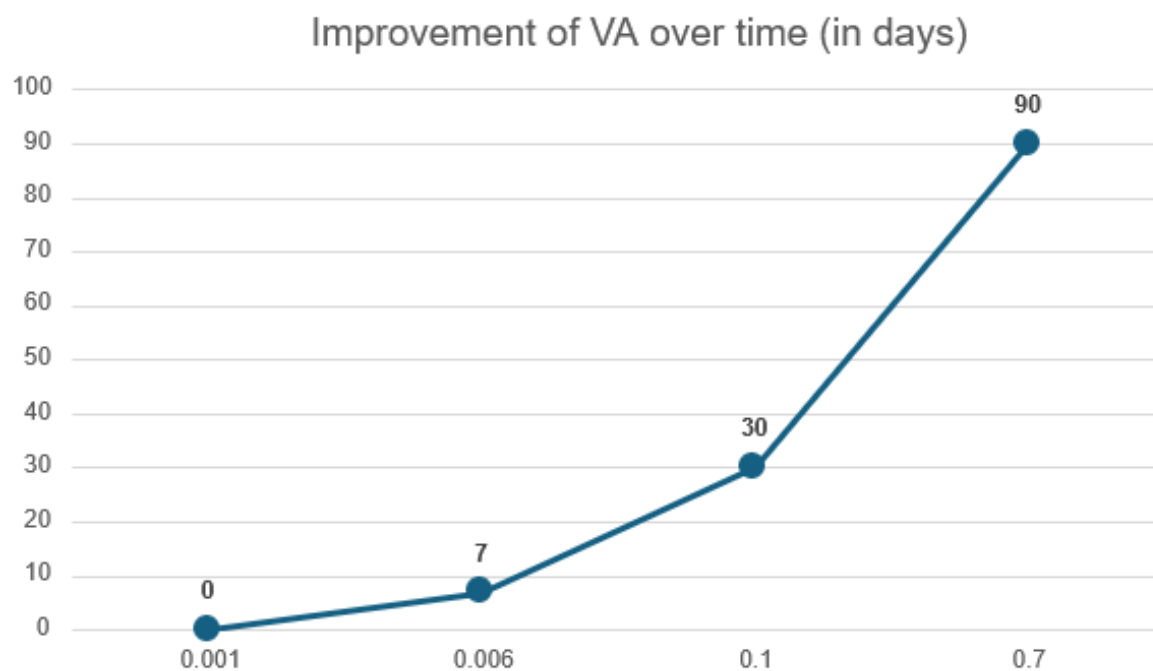


Figure 3. Line graph of visual acuity versus time since surgery



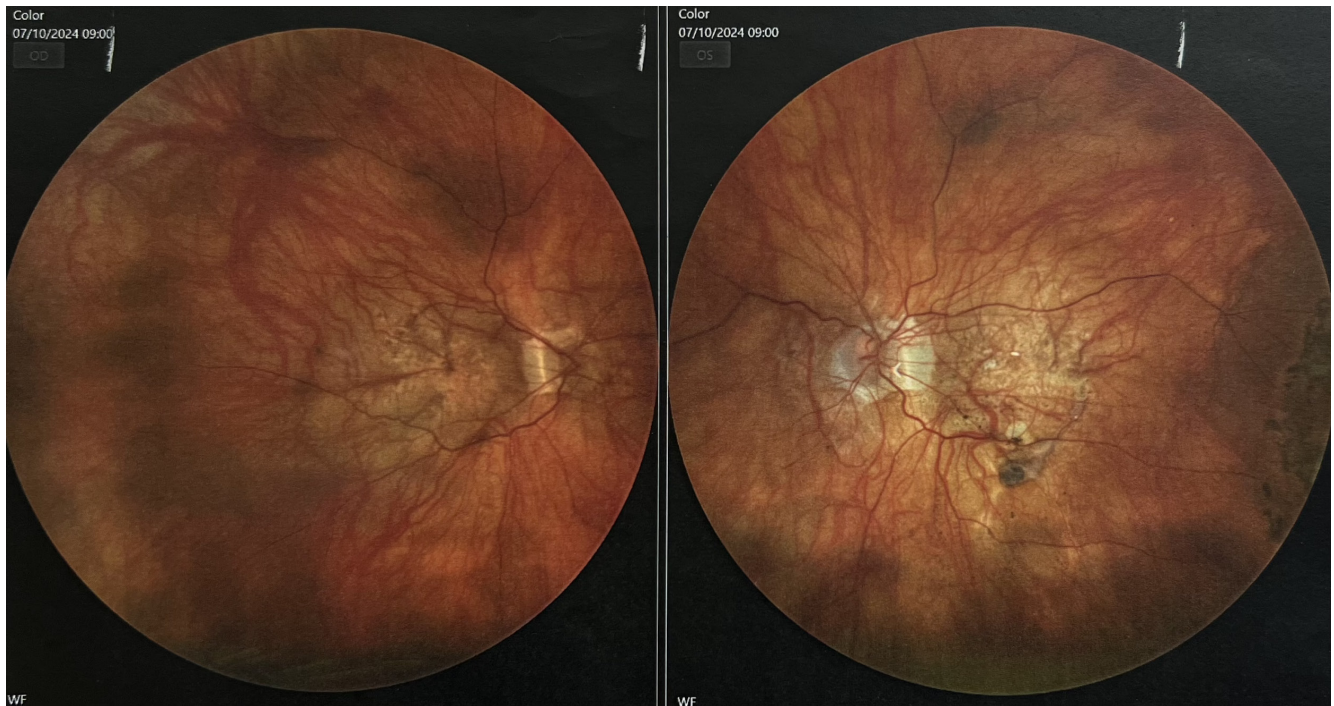


Figure 4. Color photograph of the fundus of the OD and SL; in the OS, the endotamponade with silicone oil is visible, as well as the applied retina in all quadrants

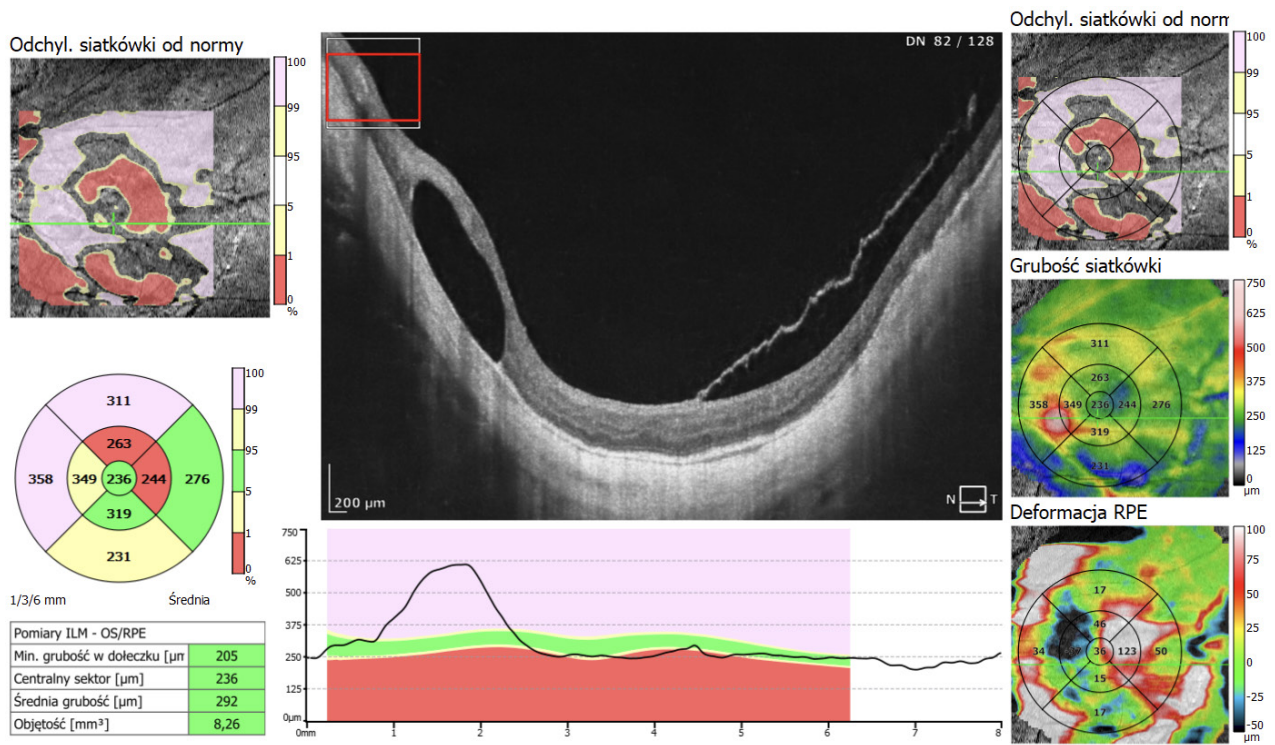


Figure 5. Optical coherence tomography study of the OS 5 months after the PPV procedure

complication, may not be effective. For instance, an attempt to evacuate the blood within this timeframe failed, as reported by Qureshi, Jalil, Sousa *et al.* [7].

### 3.2. Surgical intervention after 23 days

Surgical intervention in the patient we described occurred after 23 days and was fully successful. Similar results were obtained by the authors Quershi, Jalil, Sousa *et al.* performing blood drainage in two patients 20 and 22 days after SCH, respectively, obtaining satisfactory anatomical and functional results [7].

### 3.3. Myopia as a risk factor

Myopia is considered a risk factor for SCH during cataract surgery due to the increased axial length, which leads to greater fragility of the choroidal vessels, making them narrower and more stretched. Doppler ultrasonography of these altered vessels reveals reduced blood flow [13]. In cases of high myopia, Laplace's law has been applied to the corneo-scleral coating. Larger eyes and/or thinner layers of corneo-scleral tissue will exhibit greater wall stress. In addition, the tension increases in proportion to the intraocular pressure. It follows that the same value of pressure exerts much greater pressure on the walls of the eyeball and vessels in large eyes. When the myopic eye is opened and the pressure in the eyeball reaches atmospheric pressure, the weak and stretched ciliary vessels lose support due to the large pressure drop in their surroundings and easily rupture. In addition, the reduced stiffness of the thin and flaccid sclera with its tendency to collapse intraoperatively is an additional factor responsible for the higher incidence of SCH [9,10,14,15,16]. The length of the eyeball of the patient we described was 33.18 mm, thus demonstrating significant wall tension, increased vascular fragility and thus a significant risk of bleeding.

### 3.4. When to perform a PPV procedure

According to the authors Meier and Wiedemann, posterior access vitrectomies should be performed in a situation where the hemorrhage involves the macula, which may cause damage to the photoreceptors of the fovea due to toxicity or hypoxia caused by SCH or two quadrants behind the equator without its involvement [9,10,17]. According to Quershi, Jalil, Sousa *et al.* and Reynolds, Haimovici, Flynn *et al.* surgical intervention should also be undertaken when SCH co-occurs with a complication, such as vitreous hemorrhage or entrapment or when the "kissing choroidal sign" occurs [7,18].

### 3.5. Our conduct

The patient we described had a complicated SCH, which consisted of a hemorrhagic retinal detachment with macular involvement and the presence of a "kissing choroidal sign" on B projection ultrasound. The above factors led to the decision to extend the procedure of draining blood from the choroidal space to include vitrectomy from a posterior access. Such a procedure was also described by the authors Quershi, Jalil, Sousa *et al.* [8]. On the other hand, the significant extent of bleeding into the choroidal space may have been caused by the patient's intake of *Acidum acetylsalicylicum* in a daily dose of 150 mg [19].

## 4. Conclusions

In conclusion, despite the difficulties associated with high myopia and extensive hemorrhage in the suprachoroidal space that were present in our patient, the PPV procedure (23G) proved to be extremely effective for achieving satisfactory visual acuity and restoring correct anatomical conditions. The 23-day period after the SCH did not disqualify the patient from undergoing surgical provision of the eye.

### Authors' contribution

Sebastian Sirek; Dawid Woszczek - Research concept and design, Supervising the project

Tomasz Wilczyński; Sebastian Serek - Carrying out the surgery  
Dawid Woszczek - Acquisition of data, Data analysis and interpretation

Sebastian Sirek; Dawid Woszczek - Writing - Original Draft Preparation, Writing - Review and Editing, Visualization, Literature review

Dorota Wyględowska-Promieńska - Final proofreading and approval of the version for publication

### ORCID

Dawid Woszczek <https://orcid.org/0009-0007-0469-6913>

Sebastian Sirek <https://orcid.org/0000-0002-3138-3011>

Tomasz Wilczyński <https://orcid.org/0000-0002-0683-452X>

Dorota Wyględowska-Promieńska <https://orcid.org/0000-0001-5336-3460>

### Conflict of interest

The authors have no potential conflicts of interest to declare.

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