International Journal of Retina (*IJRETINA*) 2025, Volume 8, Number 1.
P-ISSN. 2614-8684, E-ISSN.2614-8536

SUPRACHOROIDAL HAEMORRHAGE CAUSED BY VALSALVA MANEUVER DURING VITRECTOMY: A CASE REPORT

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Abstract

Introduction: *Suprachoroidal hemorrhage is a rare but significant complication that can occur during intraocular surgery due to valsalva maneuver while patient awake. A rapid blood accumulation in the suprachoroidal space due to increased tension such as valsalva manuever can caused by rupture of the posterior ciliary arteries or vortex veins.*

Case report : *A 43-year-old man with drop IOL following eventful cataract surgery underwent vitrectomy, IOL explantation and iris claw IOL implantation under general anesthesia. After core vitrectomy and IOL explantation the patient suddenly awake. Iris claw IOL implantation was proceed. At the end of surgery massive suprachoroidal hemorrhage was found. One day postoperative the visual acuity was hand movement. Suprachoroidal and vitreous hemorrhage were observed. Oral and topical steroid were administered. Three months post operative the visual acuity 20/50 and residual suprachoroidal hemorrhage was observed.*

Discussion: *Suprachoroidal Hemorrhage incidence during intraoperative is not known because it occurs very rarely. Our case highlights the Valsalva maneuver event during vitrectomy which cause sudden suprachoroidal hemorrhage.*

Conclusions: *Valsava maneuver during vitrectomy could cause a devastating complication such as suprachoroidal hemorrhage. Although it is one of the reversible complications of anesthesia awareness during vitrectomy, it can be resulted severe visual impairment.*

Keywords: Suprachoroidal hemorrhage, Vitrectomy, Valsalva maneuver, General Anaesthesia **Cite This Article**: RAHMA, Nur Ainun et al. SUPRACHOROIDAL HAEMORRHAGE CAUSED BY VALSALVA MANEUVER DURING VITRECTOMY. **International Journal of Retina**, [S.l.], v. 8, n. 1, p. 65, mar. 2025. ISSN 2614-8536. Available at: <https://www.ijretina.com/index.php/ijretina/article/view/311>. Date accessed: 05 mar. 2025. doi: https://doi.org/10.35479/ijretina.2025.vol008.iss001.311.....

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INTRODUCTION

Suprachoroidal hemorrhage (SCH) is a rare but significant complication that can occur following intraocular surgery.[1] The actual incidence of this uncommon complication in vitrectomy is not clearly established because small hemorrhages may go unnoticed or unrecorded in clinical records unless they are systematically documented. The rarity of suprachoroidal hemorrhage complicates the analysis of its causes, outcomes, prevention, and treatment.[2] It has been observed in connection with various procedures including pars plana vitrectomy.[3] Pars plana vitrectomy (PPV) has been widely acknowledged as an effective and safe surgical intervention for a wide range of vitreoretinal diseases. Suprachoroidal complications are relatively rare complications of vitreoretinal surgery.[1] It occurs as a result of rapid blood accumulation in the suprachoroidal space due to increased tension and rupture of the posterior ciliary arteries or vortex veins.[4] Suprachoroidal hemorrhage is a serious complication of pars plana vitrectomy (PPV) that can be associated with a guarded visual prognosis.[1]

Suprachoroidal hemorrhage can also be associated with subretinal neovascular membranes, laser photocoagulation, blood clotting disorders, and valsalva maneuver.[5] In a Valsalva maneuver, a sudden increase in venous pressure may lead to vessel-wall rupture by an apparently excessive pressure gradient across the vessel wall.[6] The intraoperative suprachoroidal hemorrhage is an uncommon but devastating complication of PPV, The purpose of this case report to demonstrate a case of suprachoroidal haemorrhage during vitrectomy under general anaesthesia caused by intraoperative awareness.

CASE REPORT

A 43 years old man presented with sudden decrease of vision one week after eventful cataract surgery. The visual acuity was 1/60 and the IOP was 15 mmHg. Anterior chamber was quite, iris tremulans and aphakia. IOL was dropped to the vitreous. The patient was planned to underwent pars plana vitrectomy (PPV), IOL explantation and retropillary iris claw-IOL implantation under general anaesthesia.

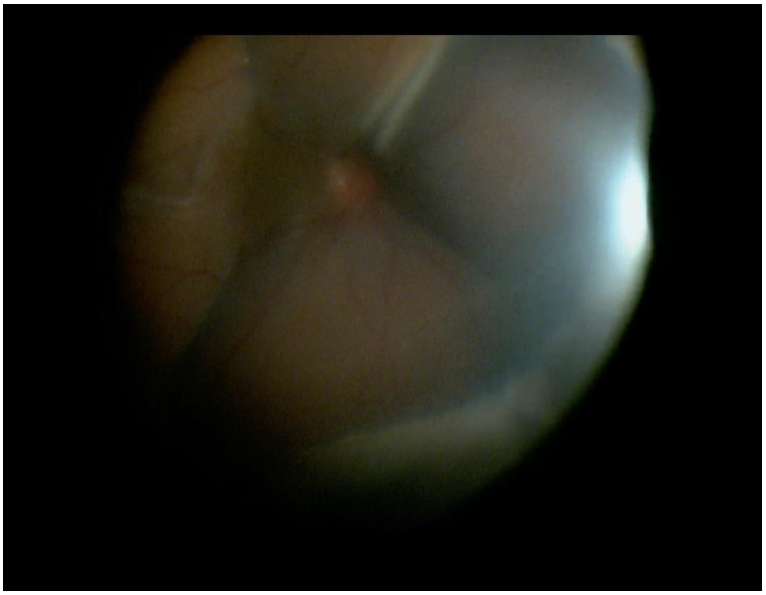

Fig.1 **Massive suprachoroidal hemorrhage observed during vitrectomy following valsalva maneuver.**

During surgery and IOL explantation was perfomed uneventful. However, the patient suddenly awake and massive suprachoroidal hemorrhage occurred (Fig.1). Nevertheless iris claw IOL was implanted retropupillary.

One day postoperative, the visual acuity was hand movement and IOP was 15 mmHg. Ultrasonography showed vitreous hemorrhage and suprachoroidal hemorrhage (Fig.2A). Cornea was clear and the IOL was enclaved retropupillary (Fig.2B). Oral and topical steroid was given.

One week after the surgery, the visual acuity improved to 20/60 and intraocular pressure was 22 mmHg. Ultrasonography demonstrating vitreous opacities and suprachoroidal hemorrhage improved (Fig.3A). Fundus photograph showed chorioretinal folds (Fig.3B).

At 3 months of follow up, the suprachoroidal haemorrhage residual, the final best corrected visual acuity (BCVA) was 20/50 with intraocular pressure (IOP) 22 mmHg. Ultrasonography showing Posterior segment examination revealed absorbed haemorrhage (Fig.4A). Fundus at his last follow-up showed minimal residual suprachoroidal hemorrhage (Fig.4B).

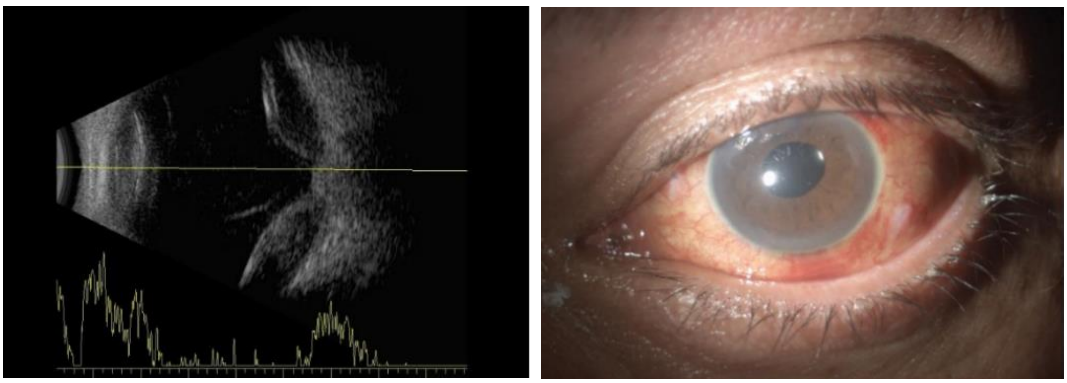

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Fig.2 **First day post-surgery examinations. (A) Ultrasonography of the left eye showed round smooth dome shaped inferiorly and superiorly attached to the optic disc. The fluid in the suprachoroidal space appeared to be anechoic (serous choroidal detachment) and some had mild to moderated echo amplitude (hemorrhagic choroidal detachment). (B) Slit lamp examination showed clear cornea, round pupil and centrally placed retropupil iris claw.**

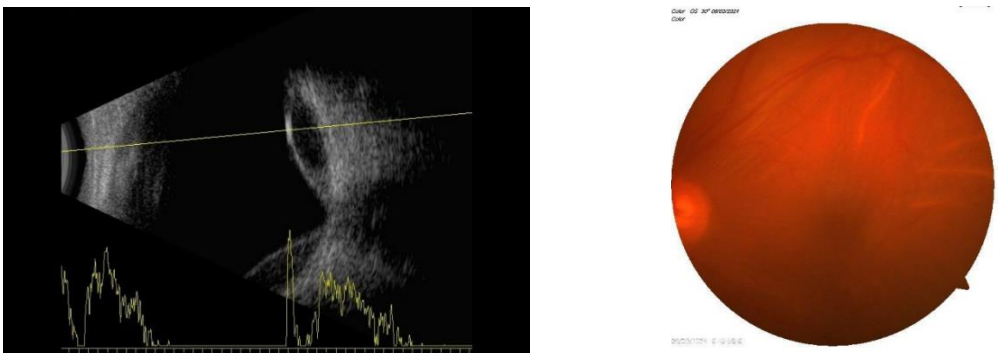

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Fig.3 **One week follow up post-surgery. (A) Ultrasonography examination showed mildly elevated dome shaped choroidal detachment with minimal echoic of fluid in the suprachoroidal space, indicating resolving serous and hemorrhagic choroidal detachment. (B) Fundus photo showed mild vitreous hemorrhage and minimal chorioretinal folds. showed vitreous hemorrhage mild and chorioretinal folds.**

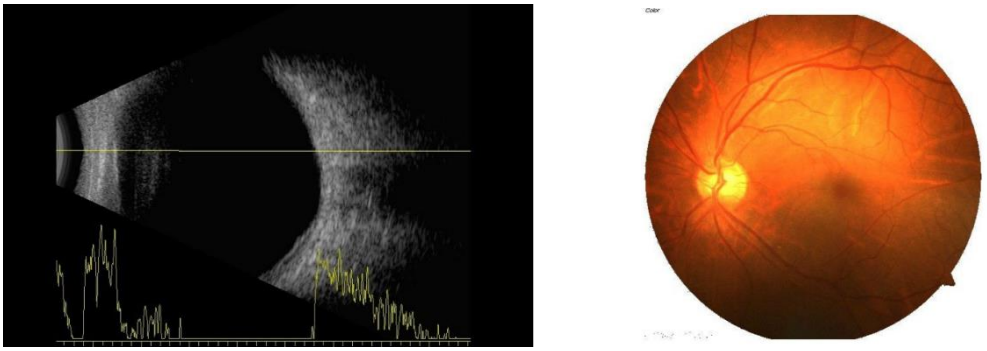

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Fig.4 **Three months follow up post-surgery. (A) Ultrasonography examination showed very minimal choroidal detachment. (B) Fundus photo was showed attach retina with residual chorioretinal folds in the periphery.**

DISCUSSION

Suprachoroidal hemorrhage is described as accumulation of blood in the potential space between the choroid and sclera, with the source of the blood being the long or short posterior ciliary arteries.[1] The incidence of suprachoroidal hemorrhage is not known because it occurs very rarely. A review of Chandra et al study conducted over 10 years involving 5459 patients, the incidence of suprachoroidal hemorrhage during Pars Plana Vitrectomy (PPV) was 56 cases. This suggests a rate of 1.03%.[2] A 1999 study by Chu et al performed the most extensive retrospective literature review in the past 25 years of the major ophthalmologic surgeries where suprachoroidal hemorrhage occurred. They found that risk was higher for patients undergoing vitreoretinal surgery (range: 0.17% to 1.9%).[7] Piper et al found that the incidence of suprachoroidal hemorrhage in their study involving pars plana vitrectomy was 13 out of 683 cases (1.9%). Among these, ten cases (1.5%) were first observed during the surgery, while three cases (0.44%) were detected during the postoperative period.[8] Qureshi and associates described 20 cases of suprachoroidal hemorrhage during intraocular surgery. Of the 20 patients, only 2 cases of suprachoroidal hemorrhage occurred due to vitreoretinal surgery.[9] Suprachoroidal hemorrhage is a rare but well described complication of ophthalmic surgery.

Chandra et al showed significant risk factors for developing suprachoroidal hemorrhage in Pars Plana Vitrectomy included older age, systemic hypertension, male gender, the presence of rhegmatogenous retinal detachment (RRD) and pseudophakia/aphakia, presence of a dropped lens fragment and the use of antiplatelets or anticoagulants.[2] Pollack and associates report that valsalva maneuver, during vitrectomy, occurring either as bucking during premature emergence from general anesthesia or severe coughing during local anesthesia, is another risk factor for suprachoroidal hemorrhage.[10] In this case, the suprachoroidal hemorrhage occurred during vitrectomy under general anesthesia. The patient experienced a sudden, severe cough due to light anesthesia, which is believed to have triggered the valsalva maneuver.

The Valsalva maneuver caused a significant increase in venous pressure, leading to the rupture of the choroidal vessels. The Valsalva maneuver can cause choroidal hemorrhage by triggering a coughing fit during general anesthesia, which increases both arterial and venous pressures, destabilizes the choroidal vasculature, and eventually leads to the rupture of choroidal vessels. The Valsalva maneuver occurs as a forced exhalation against a closed glottis, resulting in increased intrathoracic pressure, which leads to complex respiratory and vascular responses. The Valsalva maneuver can be divided into four phases: Phase 1:

In this initial phase, there is a transient increase in intrathoracic pressure and arterial blood pressure. The increase in intrathoracic pressure due to tension temporarily enhances left ventricular ejection, which is cause blood to be expelled from thoracic vessels, leading to an increase in arterial pressure. Phase 2 (Strain Phase): During this phase, it begins with a progressive fall in systolic, diastolic, and pulse pressure as a result of obstructed venous returned. The impaired venous return makes the blood from thorax and abdomen transferred with an increase in peripheral venous pressure, which is can be noticed by the increase of jugular vein. Concurrently, the filling of the right and left sides of the heart decreases, which results in a decrease in mean arterial pressure and pulse pressure, leading to an increase in heart rate. Phase 3 (The release of airway closure phase): As the tension ceases, the intrathoracic pressure starts to decrease. Meanwhile, the blood pressure suddenly drops causing from the pooling of blood in pulmonary vessels. This mechanism makes venous return, diastolic filling, and stroke volume increase and a rise in heart rate. Phase 4 (Post-Strain Phase): In this final phase, heart rate and total peripheral resistance increase, causing a rapid and significant rise in arterial pressure, referred to as the "phase 4 overshoot." This phase is characterized by an increase in systemic arterial pressure and the appearance of reflex bradycardia.[11–13]

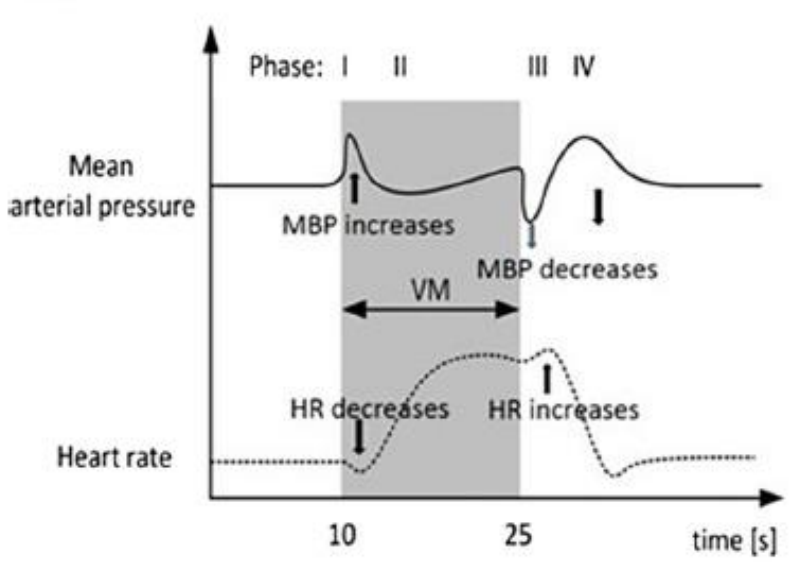

Fig.5 **Representation of mean arterial pressure and heart rate during phases in Valsalva Maneuver.**

The increase in central venous pressure and systemic arterial blood pressure, characteristic of the late phase of the Valsalva maneuver, leads to an increase in choroidal blood flow. Particularly, the rise in central venous pressure causes resistance in the episcleral veins, which is reducing aqueous outflow. The narrowed anterior chamber during valsalva maneuver cause a higher aqueous humor outflow resistance and it increase intraocular pressure (IOP). Intraocular pressure is normally 16 ± 5 mmHg. During intraoperation the intraocular pressure must be maintain within this normal range to ensure constant corneal curvature and proper refracting index of the eye. A sudden increase in systolic blood pressure such as valsalva maneuver can cause a transient acute rise in IOP.[14] On the other hand, some literature reported that valsalva maneuvers can cause thickening of the anterior and the ciliary body during the phase 2.[15]

In the management of suprachoroidal hemorrhage, the choice of treatment is guided by the extent of eye damage. Treatment options vary from observation to surgical procedures, including sclerotomy drainage, sclerotomy drainage with or without anterior chamber formation, limited anterior vitrectomy or pars plana vitrectomy, and

the use of intraocular tamponade.[16] Indications for surgery include: kissing choroidal detachments, large non-kissing choroidal detachments involving the macula, associated vitreous incarceration or hemorrhage, retinal incarceration or detachment, lens subluxation, significantly uncontrolled intraocular pressure (IOP), and/or persistent eye pain.[9] In considering the underlying diagnosis for our patient is IOL drop. This means that the retina is still attached and does not require tamponade. This is different from a case of retinal detachment where, if no drainage is performed, the volume of silicone tamponade will be inadequate. Therefore, in this case, there is no indication for surgical intervention. Conservative management is implemented for this patient.

Visual outcome after suprachoroidal hemorrhage during intraocular surgery is influenced by the etiology and extent of the haemorrhage, the presence of concurrent retinal detachment, and possibly by its management.[17] In a series of seven suprachoroidal hemorrhage cases caused by valsalva maneuvers during vitrectomy, Pollack et al report 5 out of 7 patients had poor visual acuity, with 4 cases having no light perception and 1 case having light perception as the final visual acuity (71,4%).[10] Some findings from other studies were similar to those reported by Pollack et al, including the generally poor visual outcome, Chandra and associates in their study showed that 46.1% of patients had visual acuity of counting fingers or hand motion and perception of light.[2] Wang and associates in their study shows that suprachoroidal haemorrhage patients with previous pars plana vitrectomy (PPV) have a 50% final good VA. It can be influenced by multiple factors, such as age, the grade of suprachoroidal hemorrhage, retinal detachment problem at the time of suprachoroidal hemorrhage, and the existence of suprachoroidal hemorrhage complexity with retinal incarceration.[18] In this case the patient has final best corrected visual acuity (BCVA) was 20/50 with intraocular pressure (IOP) 22 mmHg. This may caused by the etiology is IOL drop, no retinal detachment problem and no suprachoroidal hemorrhage complexity with retinal incaceration.

CONCLUSION

Suprachoroidal hemorrhage is an extremely rare yet potentially serious complication of vitrectomy. In conclusion, the Valsalva maneuver during vitrectomy can lead to significant suprachoroidal hemorrhage. In our case, despite the presence of minimal residual hemorrhage, the patient's vision improved, although it did not fully return to normal. Intraoperative suprachoroidal hemorrhage, though uncommon, is a catastrophic complication of pars plana vitrectomy (PPV) that can dramatically worsen the surgical outcome if not managed appropriately.

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