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# Tissue Plasminogen Activator-Assisted Vitrectomy for Ruptured Eye with Suprachoroidal Hemorrhage

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## Key Words

Tissue plasminogen activator · Suprachoroidal hemorrhage · Rupture · Ocular injury

## Abstract

**Purpose:** To report a case of a ruptured eye with a suprachoroidal hemorrhage (SCH) in which tissue plasminogen activator (tPA)-assisted vitrectomy was successful in reconstructing the globe and restoring good vision.

**Case:** A 32-year-old man was struck on the right eye by a surfboard. His eye was ruptured and his visual acuity decreased to hand movements. Surgery was immediately performed to successfully close the ruptured globe. Nine days later, a second surgery was performed, and tPA (25 µg/0.1 ml monteplase) was used to liquefy and drain the SCH. This freed enough vitreous space for a more comprehensive vitrectomy. Eighteen months after the injury, the retina remained attached, and the decimal best-corrected visual acuity improved to 0.8.

**Conclusion:** tPA was helpful in lysing a massive SCH, thereby contributing to the excellent visual outcome. tPA-assisted drainage should be considered in cases of massive SCH when drainage is difficult due to an incomplete lysis of the clot.

## Introduction

A suprachoroidal hemorrhage (SCH) in eyes with a ruptured globe is one of the causes of poor visual prognosis especially when it is massive and involves the macula [1, 2]. The SCH is generally drained one to two weeks after the injury when the clot has lysed. A freely moving blood clot in the suprachoroidal space in the dynamic B-mode ultrasonographic images indicates that SCH drainage can be accomplished during intraocular surgery [2]. However, the entire clot does not dissipate simultaneously, and

residual solid clots result in incomplete drainage and may hamper further procedures, such as pars plana vitrectomy, for repairing a retinal detachment (RD).

Recently, successful drainage of a subretinal hemorrhage in eyes with age-related maculopathy (AMD) during vitrectomy with the injection of tissue plasminogen activator (tPA) has been obtained [3]. We present a patient with a ruptured globe with a massive SCH where a tPA-assisted vitrectomy was successful in removing the SCH, which allowed the reconstruction of the posterior pole of the eye to attain good visual outcome.

## Case Report

A 32-year-old man was struck on the right eye by a surfboard which ruptured the globe, and his visual acuity was reduced to hand movement vision. Surgery was immediately performed to close the open globe. Intraoperatively, a Y-shaped laceration was found between the lateral and inferior rectus muscles approximately 15 mm posterior to the limbus (fig. 1). The lateral rectus muscle was temporarily disinserted, and the wound was closed with several interrupted 8-0 nylon sutures. The muscle was sutured back to the site of the original insertion.

Postoperatively, a dense hyphema hampered the view of the fundus. Computed tomography showed a massive suprachoroidal hemorrhage that occupied about 3/4 of the vitreous cavity in the nasal and superior space (fig. 1).

Nine days after the injury, a second surgery was performed with a choroidal tap, lensectomy, pars plana vitrectomy, and an encircling scleral band. After lens aspiration, a 25-gauge irrigation cannula was placed in the anterior chamber to control the intraocular pressure, and a posterior sclerotomy for drainage was created 12 mm posterior to the limbus in the superior nasal quadrant. Because the firm SCH clot did not permit easy drainage, tPA (25 µg/0.1 ml monteplase) was injected into the suprachoroidal space (online suppl. video 1; see [www.karger.com/doi/10.1159/000342136](http://www.karger.com/doi/10.1159/000342136) for all online suppl. videos) from sclerotomy site using a 27-gauge blunt needle. Sixty minutes later, several smaller clots were extracted from the sclerotomy drainage site (online suppl. video 2), and the vitreous cavity was larger and relatively clear. This permitted standard 3-port vitrectomy to be performed. First, the vitreous hemorrhage was removed, and the clear view of the retina allowed us to detect a RD. The retina was reattached by drainage of the subretinal fluid, and an encircling with silicone band. Then a small amount of silicone oil was injected because part of the vitreous cavity was still occupied by the reduced SCH (fig. 2). The residual SCH was gradually absorbed and was not detected 34 days after the injury.

On day 70 after the injury, the silicone oil was removed but two days later the retina re-detached. Additional vitrectomy with SF6 tamponade and intraocular lens suturing were performed on day 77 after the injury. Sixteen months after the injury, the retina was still attached and the visual acuity had improved to 0.8 with a correction of –3.50 diopter lens (fig. 2).

## Discussion

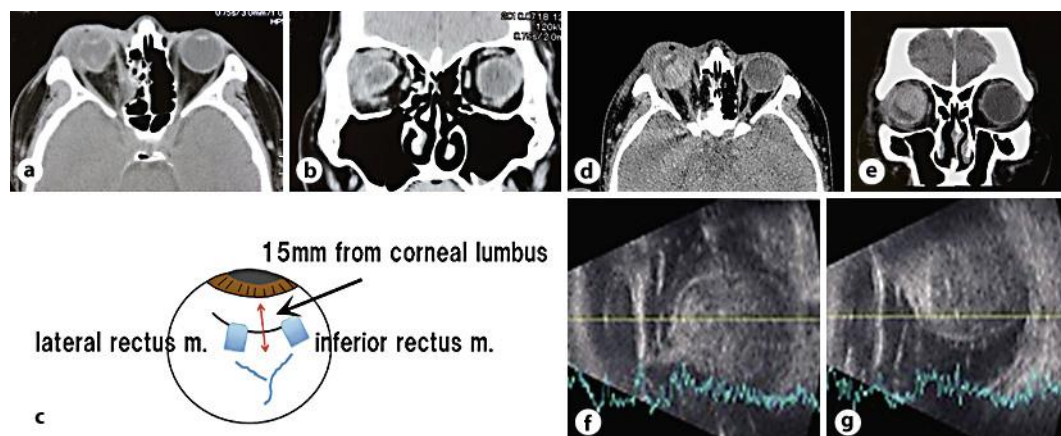
Our results showed that a two-step surgical strategy can lead to good visual outcomes for open-globe injuries accompanied by a large SCH involving the macula. The initial surgery is performed immediately to close the open eye, and after about two weeks when the SCH is moveable, the second surgery is performed to treat the posterior pathology [1, 2]. The time of the combined SCH drainage through the sclerotomy and pars plana vitrectomy for secondary RD is critical. Incomplete lysis of the clot may lead to difficulty in clearing the vitreous cavity to perform surgery on the

retina, e.g., repairing a RD. Failure to obtain a clear view of the retina can also lead to relative poor visual outcomes especially when the SCH is massive [1, 2].

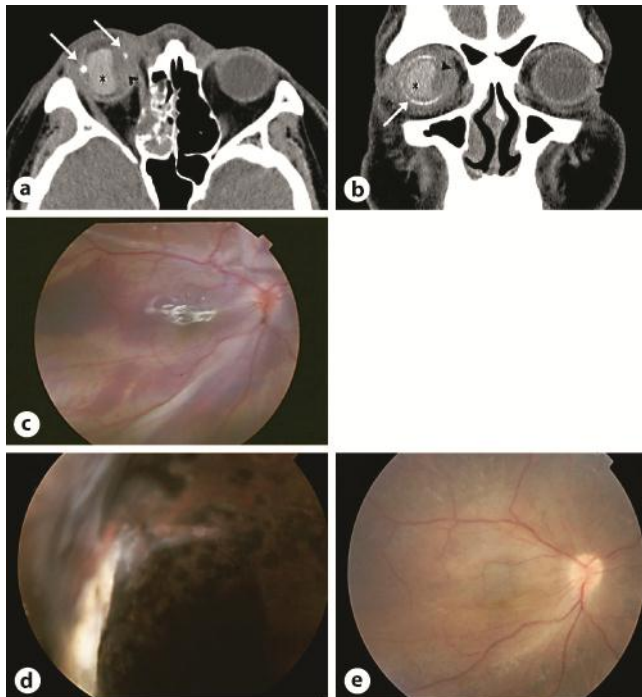
At present, tPA-assisted drainage or displacement of subretinal hemorrhages in eyes with AMD or retinal macroaneurysms is commonly performed. Animal experiments have shown the efficacy of tPA in treating experimental SCHs [4], but thus far, only a single case has been reported where tPA was used to assist in the drainage of a SCH [5]. The results of our case showed that injection of tPA into the SCH led to a lysis of the clot that led to a smooth drainage of the SCH. Thus, we recommend that tPA be used in eyes with a large SCH when drainage is difficult due to incomplete lysis of the clot.

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**Fig. 1.** Computed tomography (CT), B mode ultrasonography (B-mode echo), and a scheme showing intraoperative findings of the primary surgery for an open-globe injury. **a, b** Coronal (**a**) and transverse (**b**) images showing distorted right eye globe and orbital fracture. **c** A Y-shaped wound can be seen between the lateral and inferior rectus muscles and approximately 15 mm behind the limbus. The lateral rectus muscle was temporarily removed and sutured back to the original insertion site after the wound was closed with several interrupted sutures by 8-0 nylon. **d, e** Coronal (**d**) and transverse (**e**) CT images taken on day 4 after the primary surgery. **f, g** Horizontal (**f**) and vertical (**g**) sectioned B-mode echo images taken 3 days after the primary surgery. Massive suprachoroidal hemorrhage occupied about 3/4 of the vitreous cavity at the nasal and superior space.



**Fig. 2.** Computed tomography (CT) and fundus photograph after the second surgery. **a, b** Transversely (**a**) and coronally (**b**) sectioned CT images taken 3 days after the second surgery showing that a clot (arrowhead) has been reduced. Arrows indicate encircling band and asterisk indicates silicone oil (S.O.). **c** Fundus photograph of the right eye taken 15 days after the second surgery showing attached retina under S.O. tamponade and subretinal hemorrhage. Best-corrected visual acuity (BCVA) was 0.07. **d, e** Fundus photograph of the right eye taken 7 months after the second surgery showing attached retina without any vitreous substitute. BCVA was 0.8.

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