

Submacular Surgery in Submacular Hemorrhage Unresponsive to Subretinal t-PA

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ABSTRACT

We performed membrane excision and hemorrhage removal via submacular surgery in the second surgical intervention in a patient who received subretinal t-PA due to subretinal hemorrhage following anti-VGEF injection but failed to achieve successful displacement. It was observed ambulatory vision could be achieved in the patient due to severe RPE atrophy within 3 months after surgery.

Keywords: Neovascular age-related macular degeneration, subretinal hemorrhage, t-PA, pars plane vitrectomy.

INTRODUCTION

Thick and widespread subretinal hemorrhages secondary to age-related macular degeneration (AMD) is a severe clinical presentation that leads sudden and severe loss of vision¹. In patients with severe subretinal hemorrhage, a rapid, permanent loss of vision can occur due to rapid formation of fibrous tissue which leads mechanical injury in photoreceptors, disruption of relationship of photoreceptors with retinal pigment epithelium and choroidal layer, and direct effect of iron toxicity². In these patients, subretinal hemorrhage must be rapidly removed from macular region as the damage can become permanent rapidly. Subretinal hemorrhage can be removed from macula by intravitreal air or gas administration, intravitreal t-PA (tissue plasminogen activator, Alteplase) and subretinal t-PA¹.

In studies on pars plana vitrectomy (PPV) and direct removal of subretinal hemorrhage, successful outcomes could not be achieved in most instances³. In our study, it was aimed to presents outcomes of an approach including subretinal membran extraction and removal hemorrhage in a patient who failed to achieve successful and permanent hemorrhage removal with pars plana vitrectomy (PPV), subretinal t-PA and sulfur hexafluoride (SF6).

CASE REPORT

In a 78-years old women, it was found that she received intravitreal anti-vascular endothelial growth factor (anti-VGEF) injections (4 injections to the right eye and 3 injections to the left eye). The patient presented with sudden impairment in vision one day after last intravitreal injection to the right eye. The visual acuity was measured as "hand movements" in the right eye and 2/10 in the left eye. Both eyes were pseudophakic. The intraocular pressure was measured as 11 mmHg in the right eye and 12 mmHg in the left eye. In fundus examination, a subretinal hemorrhage (12x6 disc diameter in size) in the right eye and a wide fibrovascular pigment epithelium detachment in the left eye (Figure 1a, 1b). The patient was informed about clinical condition and PPV, subretinal t-PA and intravitreal SF6 administration were recommended. Since t-PA is unavailable in our clinic, the patient referred to another facility (a private healthcare facility) where she PPV, subretinal t-PA and intravitreal 20% SF6 administration in the right eye 5 days after onset of hemorrhage. On the postoperative week 1, it was found that visual acuity was at the level of "finger counting at 1 m" and that subretinal hemorrhage was displaced (Figure 2a, 2b). The patient presented to our clinic with sudden onset of vision loss 3 weeks after first surgery. In the ophthalmologic examination, visual acuity was at the

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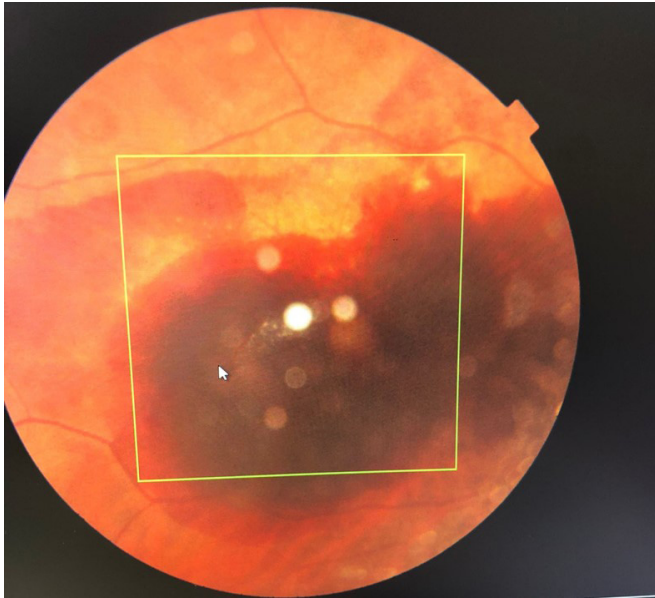


Figure 1a: Submacular hemorrhage at initial presentation

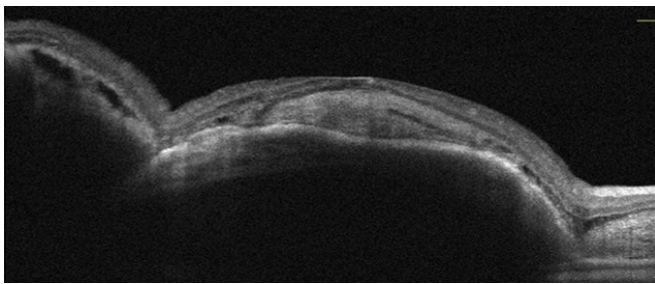


Figure 1b: Optical coherence tomography image at initial presentation.

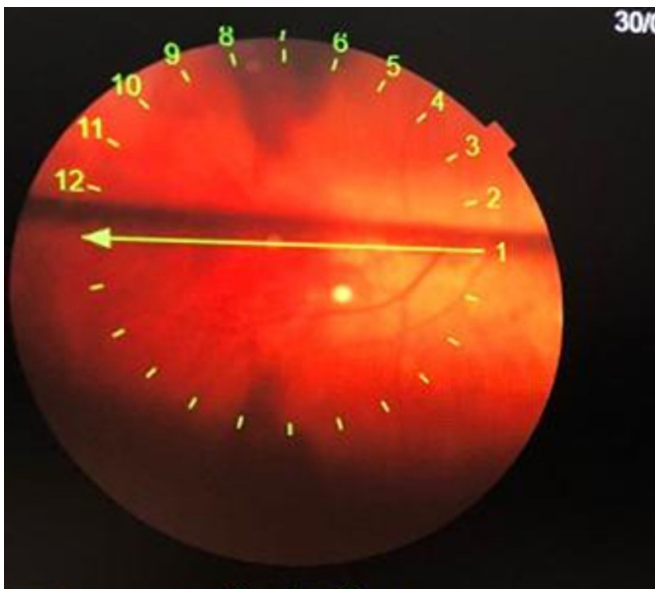


Figure 2a: Hemorrhage displaced following Subretinal t-PA.

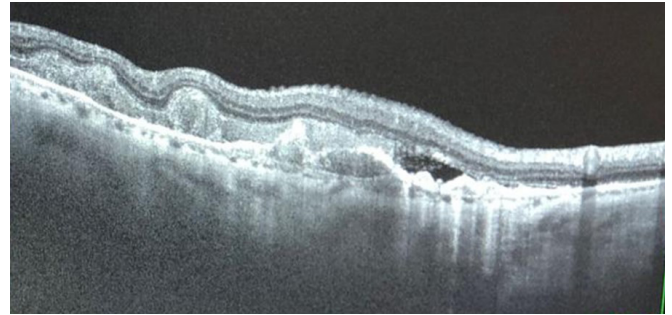


Figure 2b: Subretinal hemorrhage displacement on OCT.

level of "hand movement". It was found that there was intravitreal hemorrhage and that subretinal hemorrhage was relapsed. It was recommended to perform PPV after providing detailed information about risks. The patient was also informed that either hemorrhage displacement or removal could be performed based on the subretinal hemorrhage observed during surgery.

After removal of vitreous hemorrhage by pars plana vitrectomy, it was seen that there was a wide subretinal plaque within subretinal hemorrhage (Figure 3). It was decided to remove subretinal hemorrhage and excise fibrin plaque; thus, hemorrhage and clots were removed from subretinal region via retinotomy from temporal to macular region. The wide fibrin plaque was excised and extracted via vitrectomy probe (Figure 4).

It was found that the visual acuity was improved to level of "finger counting at 1 m" and that subretinal region was free from hemorrhage on week 1 after second surgery (Figure 5). On week 4 after second surgery, visual acuity was improved to "finger counting at 2 m". In addition, there was patch RPE atrophy and occasional hemorrhage in the subretinal hemorrhage (Figure 6a, 6b). On week 8 after second surgery, visual acuity was at the level of "finger counting at 1 m"; that severely atrophic RPE appearance was persisted (Figure 7a, 7b).



Figure 3: Intraoperative subretinal fibrin plaque.

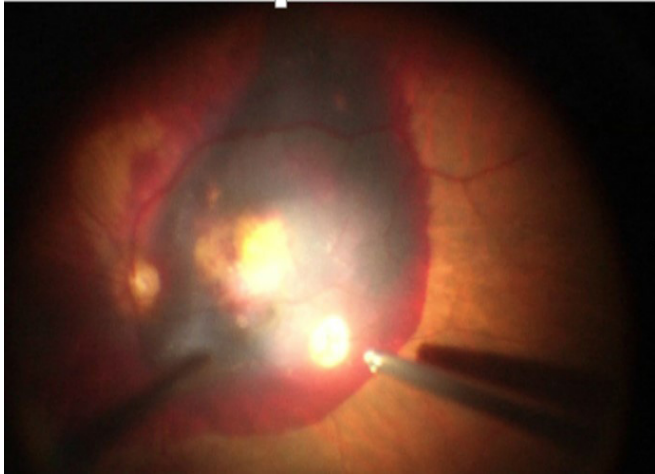
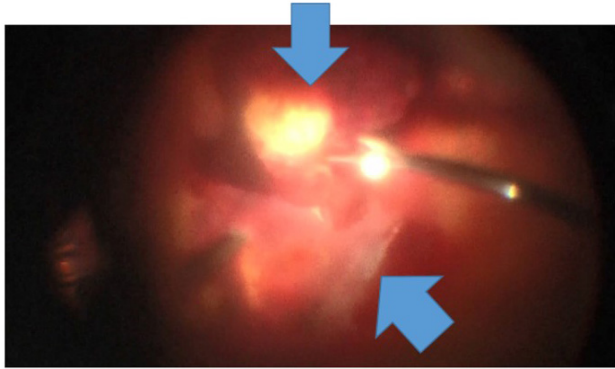


Figure 4: Intraoperative view, arrows : subretinal membrane excised; retinotomy region.

EKSİZE EDİLEN SUBRETİNAL MEMBRAN



RETİNOTOMİ BÖLGESİ

Figure 5: Intraoperative view of retinotomy area, macular scar and fluid-gas level



Figure 6a: Patchy atrophy of retinal pigment epithelium and hemorrhage in subretinal region on week 4.

DISCUSSION

Intraretinal and subretinal hemorrhages develops in the considerable proportion of patients with AMD. Most are minor and thin hemorrhages which mostly recover with anti-VGEF treatment. However, thick and wide subretinal hemorrhages occur in the minority of AMD patients⁴. There is an increased if anticoagulant agents and antiplatelet agents in rare instances; comorbid hypertension is additional risk. Diffuse subretinal hemorrhage can occur



Figure 6b: On OCT, patchy subretinal hemorrhage and retinal pigment epithelium atrophy on week 4.

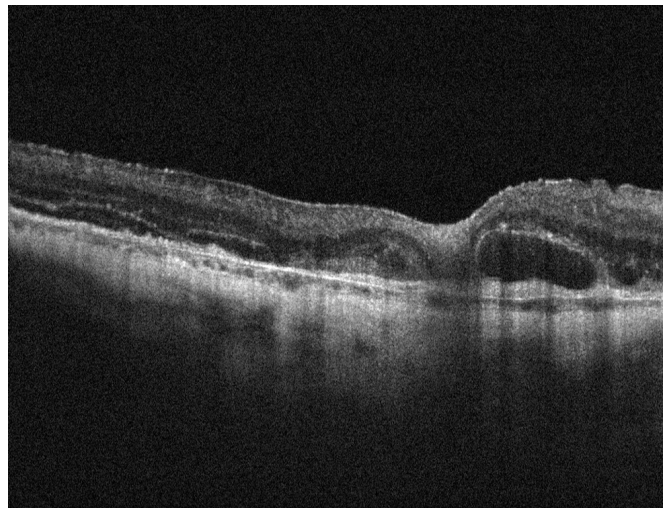


Figure 7a: Retinal pigment epithelium atrophy and occasional hemorrhages on week 8.

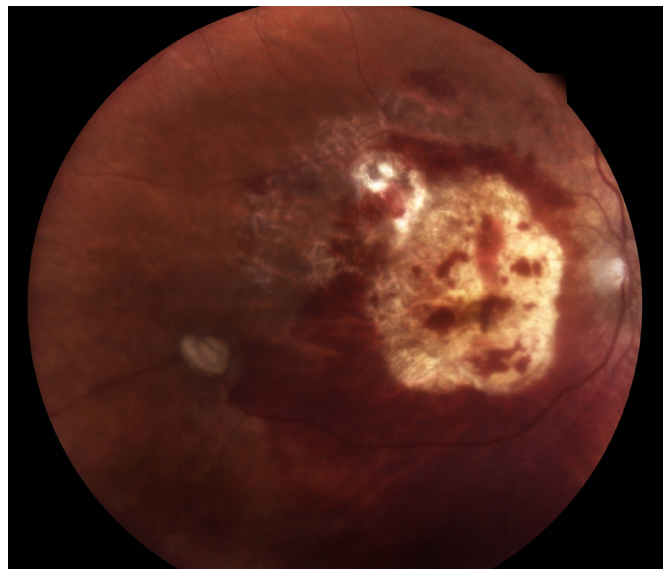
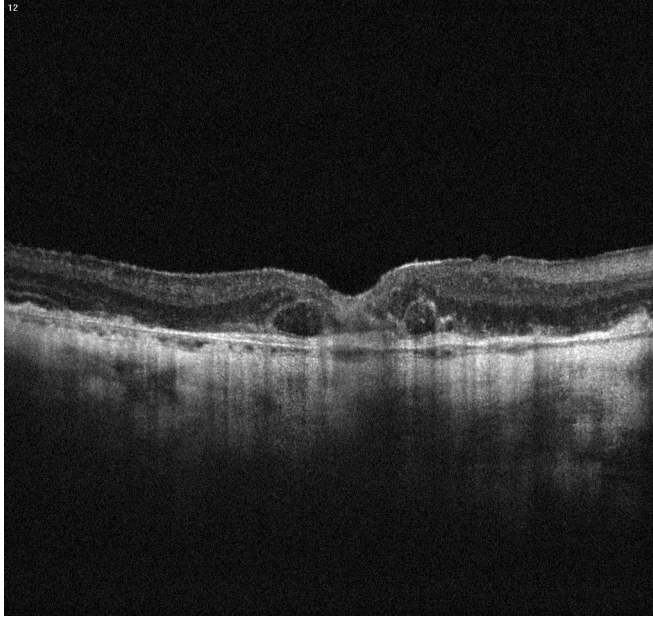


Figure 7b: OCT image on week 8.



following photodynamic therapy and intravitreal anti-VGEF injection in AMD patients⁵. In fact, subretinal hemorrhage was developed one day after intravitreal anti-VGEF injection. There was no history of anticoagulant agent use in our patient.

Several treatment options can be employed in severe submacular hemorrhages. In mild and moderate hemorrhages, anti-VGEF agents can provide successful outcomes; however, likelihood of success is lower with anti-VGEF therapy alone in diffuse hemorrhages⁶. Intravitreal t-PA and gas administration, which can be performed without need for sterile surgery room, can also be used. This has the advantages of non-invasive surgery; however, it has been reported that t-PA shows insufficient access to subretinal area. Although successful outcomes were reported in some patient groups, there is a significant group of patients with failure⁷. Pars plana vitrectomy, subretinal t-PA and intravitreal gas appear to be most successful method described in the literature. However, this approach fails to displace subretinal hemorrhage in 15% of the patients¹. In addition, timeframe is highly limited for success of this approach¹. These patients are generally considered as unresponsive, resulting in severe, permanent loss of vision. In Submacular Surgery

Trials for hemorrhagic choroidal neovascular lesion, no advantage was detected for surgery when compared to observation group. However, these results should not imply that submacular surgery will not be beneficial after unsuccessful subretinal t-PA; since subretinal t-PA was performed in only 38% of the cases³. In the presented case, although t-PA was performed within short time after onset of hemorrhage, no successful result could be achieved and subretinal fibrin membrane and hemorrhage was observed 3 weeks after t-PA. It was considered that it would not be appropriate to leave patient untreated at this point; thus, subretinal hemorrhage and fibrin were removed, which provided ambulatory vision in the patient.

In conclusion, it was concluded that, albeit partial, visual success can be achieved with additional submacular surgery in this group of patient after informing patients about all therapeutic options and risks. There is an ongoing need for prospective, comparative studies in this special group of patient.

REFERENCES

1. Chang W, Garg SJ, Maturi R, et al. Management of thick submacular hemorrhage with subretinal tissue plasminogen activator and pneumatic displacement for age-related macular degeneration. *Am J Ophthalmol.* 2014 Jun;157(6):1250-7.
2. Glatt H, Machemer R. Experimental subretinal hemorrhage in rabbits. *Am J Ophthalmol* 1982;94(6):762-773.
3. Bressler NM, Bressler SB, Childs AL, et al. Surgery for hemorrhagic choroidal neovascular lesions of age-related macular degeneration: Ophthalmic findings: SST report no. 13. *Ophthalmology* 2004;111:1993-2006.
4. Stanescu-Segall D, Balta F, Jackson TL. Submacular hemorrhage in neovascular age-related macular degeneration: A synthesis of the literature. *Surv Ophthalmol.* 2016 Jan-Feb;61:18-32.
5. Levine JP, Marcus I, Sorenson JA, et al. Macular hemorrhage in neovascular age-related macular degeneration after stabilization with antiangiogenic therapy. *Retina.* 2009;29:1074-9
6. Kim JH, Chang YS, Kim JW, et al. Intravitreal anti-vascular endothelial growth factor for submacular hemorrhage from choroidal neovascularization. *Ophthalmology.* 2014;121:926-35.
7. Sacu S, Stifter E, Vécsei-Marlovits PV, et al. Management of extensive subfoveal haemorrhage secondary to neovascular age-related macular degeneration. *Eye (Lond).* 2009;23:1404-10.