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Spontaneous separation of secondary epiretinal membrane after vitrectomy for retinal detachment

Masanori Kanai [a], Susumu Sakimoto [a,b,c,*], Kohji Nishida [a,c]

[a] Department of Ophthalmology, Osaka University Graduate School of Medicine, Osaka, Japan
[b] Department of Ocular Immunology and Regenerative Medicine, Osaka University Graduate School of Medicine, Osaka, Japan
[c] Integrated Frontier Research for Medical Science Division, Institute for Open and Transdisciplinary Research Initiatives, Osaka University, Suita, Japan

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ABSTRACT

Purpose: While secondary epiretinal membranes (ERMs) are well-documented postoperative complications following rhegmatogenous retinal detachment (RRD) surgery, literature addressing the mechanisms of spontaneous resolution, particularly in cases involving vitrectomy, remain limited. In this case report, we describe the spontaneous resolution of secondary ERM in an amateur boxer following traumatic RRD surgery.
Observations: Pars plana vitrectomy was performed for traumatic RRD in a 20-year-old man. Secondary ERM formation was observed one month after RRD surgery, resulting in retinal distortion. The ERM began to peel spontaneously and disappeared one year after surgery. His visual function did not deteriorate in the meantime.
Conclusions and Importance: Spontaneous ERM separation is possible even after vitrectomy. This is the first published observation of the formation and spontaneous disappearance of secondary ERM after vitrectomy without intervention.

1. Introduction

The epiretinal membrane (ERM) is a cellular layer composed of glial cells, retinal pigment epithelial (RPE) cells, and hyalocytes on the internal limiting membrane (ILM).[1] Postoperative secondary ERM can be observed following rhegmatogenous retinal detachment (RRD) surgery.[2,3] Progression of ERM leads to visual deterioration or metamorphopsia, and vitrectomy with membrane peeling is the only current treatment. However, a significant proportion of patients with idiopathic ERM experience spontaneous resolution, with improvement in visual acuity and decreased metamorphopsia.[4–9] Although posterior vitreous detachment (PVD) and ERM contraction are considered the mechanisms responsible for spontaneous separation of idiopathic ERM, only a few reports with vitrectomy exist in the literature in which PVD was confirmed intraoperatively. Herein, we describe a unique case of spontaneous separation of a post-vitrectomy secondary ERM observed following RRD in a 20-year-old boxer, and the healing process was monitored using optical coherence tomography (OCT).

2. Case report

A 20-year-old man with no ophthalmologic history presented with myodesopsias in the right eye immediately after a boxing match and developed an upper-right visual field defect 4 months later. His medical history included spontaneous pneumothorax. His visual acuity was 20/16 oculus dexter (OD), and his intraocular pressure was 12 mmHg OD. Fundus examination revealed detachment of the right lower retina owing to inferomedial ora serrata dialysis, whereas the macula remained attached (Figs. 1A and 2A). We opted for pars plana vitrectomy over the scleral buckling procedure because of the extent of ora serrata dialysis. PVD was confirmed using triamcinolone acetonide, and the retina was attached with perfluorocarbon liquid. Photocoagulation of the retinal tear at the ora serrata and fluid-gas exchange with sulfur hexafluoride (20%) were performed. Postoperatively, complete retinal attachment and visual acuity were maintained (Figs. 1B and 2B). However, one month after the surgery, secondary ERM was detected using OCT, resulting in retinal distortion, whereas his visual acuity was maintained at 20/20 OD without metamorphopsia (Fig. 2C). Although the foveal pit was lost and the central foveal thickness (CFT) was increased, the ellipsoid zone (EZ) was intact, and the retinal layer was not dissociated. Three months after surgery, inferior ERM separation was observed, and the CFT decreased gradually (Fig. 2D and E). One year after surgery, complete separation of the ERM and full spontaneous resolution of the retinal distortion were observed (Fig. 2F). The foveal depression

* Corresponding author. Department of Ophthalmology, Osaka University Medical School Rm. E7, 2-2 Yamadaoka, Suita, Osaka 565-0871, Japan.
E-mail address: susumu.sakimoto@ophthal.med.osaka-u.ac.jp (S. Sakimoto).

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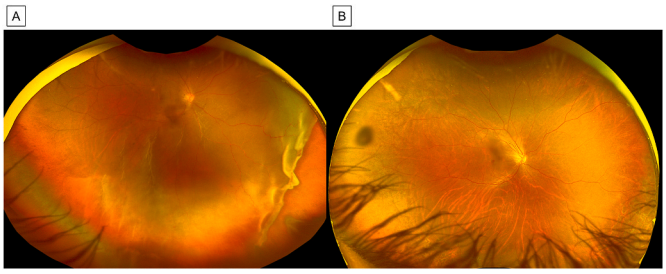

Fig. 1. Right fundus photographs at the initial visit and postoperative date. A. Right fundus photograph at the initial visit showing rhegmatogenous retinal detachment attributed to traumatic ora serrata dialysis. B. Postoperative right fundus photograph exhibiting complete retinal attachment following vitrectomy.

recovered, and the CFT decreased to normal levels. Additionally, the EZ and retinal layer disorganization did not appear. Visual acuity in OD was maintained at 20/20, and the patient did not complain of distorted vision.

3. Discussion

ERM is typically formed on the retinal surface after glial and fibrocellular proliferation.[1] Progression of ERM leads to visual deterioration with loss of foveal dip, ectopic inner foveal layers, retinal layer disruption, and cystic macula edema. Spontaneous ERM separation is rare and thought to be caused by PVD and ERM contraction.[4–9] In our case, the healing process was independent of PVD because the patient underwent vitrectomy, implying that spontaneous ERM separation can occur solely as a result of its contracting force.

Secondary ERM formation following RRD surgery occurs with an incidence of 3%–12.8%.[2,3] Vitrectomy with membrane peeling improves visual impairment.[3] In this case, secondary ERM may have been formed by RPE cells from a retinal break, or minimal posterior vitreous cortex may have remained. Vitreoretinal surgery is recommended when patients with ERM have visual impairment or metamorphopsia because ERM can cause irreversible retinal damage.[1] This patient did not present with visual deterioration or distortion, which permitted prolonged observation of the spontaneous healing process. The EZ status, which is closely related to visual function, was reported to be vulnerable to the vertical force of PVD.[8] Thus, the visual acuity of this patient may have been maintained because of the pre-existing PVD.

Some previous studies reported spontaneous resolution of ERM after photocoagulation.[4,9] Kolomeyer et al. implied that spontaneous separation of ERM can be triggered by tangential shrinkage of the inner retinal layer after laser therapy without PVD.[9] In our case, the spontaneous release of the ERM began in the lower part, where the ora serrata dialysis was located. Laser therapy was administered to address the tear during vitrectomy. ERM tearing resulting from photocoagulation may serve as an initial trigger for spontaneous membrane peeling.

Boxing athletes are reportedly more prone to traumatic RRD or retinal tears[10] likely owing to a high incidence of ocular trauma. Notably, the infratemporal blow was reported to be coup injury to the eyeball due to the limited protection offered by the orbital rim in this region. This patient was an amateur boxing athlete, presented with ora serrata dialysis located inferotemporally, possibly resulting from a coup injury sustained during the past boxing match. Despite our non-recommendation, the patient continued his boxing practice even after RRD surgery. Consequently, his right eye may have experienced strong impacts or vibrations intermittently, which could have contributed to the spontaneous separation of the secondary ERM. Mansour et al. reported that the Valsalva maneuver, utilized routinely by power athletes, could transiently elevate intraocular pressure (IOP) and potentially trigger the spontaneous release of ERM.[7]

Meyer et al. reported that the clinical presentation of ERMs substantially differed between young and older patients. The rate of spontaneous separation or recurrence of idiopathic ERM in younger individuals was reported to be higher because of their immature or dynamic cellular composition. They hypothesized that the tangential traction of ERM in young patients is likely to overcome adhesive forces, leading to spontaneous separation. In this case, such immature nature of ERM, characteristic of youngsters, may be associated with its spontaneous release.

A previous study showed that tryptase might be associated with ERM auto-peeling.[11] Tryptase is a serine protease made by mast cells. Tryptase is reported to stimulate fibroblast-mediated contraction of collagen gels.[12] ERM contraction force strengthened by tryptase activity might lead to spontaneous peeling.

4. Conclusions

To the best of our knowledge, this is the first case where the process of secondary ERM development following vitrectomy, as well as its

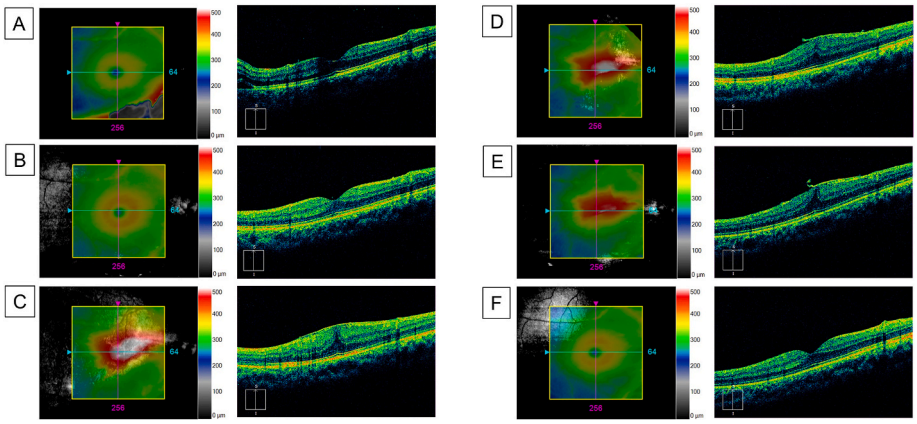

Fig. 2. Optical coherence tomography. A. Optical coherence tomography at the first visit (preoperative) reveals macular attachment, although the inferior retina portion was detached. B. Optical coherence tomography at 2 weeks postoperatively. The retina was attached after vitrectomy for rhegmatogenous retinal detachment, and no epiretinal membrane (ERM) was observed. C. Optical coherence tomography at 2 months postoperatively. The secondary ERM was detected. The foveal pit was not visible, and the central foveal thickness (CFT) was increased.
D. Optical coherence tomography at 4 months postoperatively. The inferior portion of the ERM began to spontaneously peel.
E. Optical coherence tomography at 6 months postoperatively. Spontaneous ERM peeling continued, and CFT decreased gradually.
F. Optical coherence tomography at 1 year postoperatively. The ERM was peeled off completely. The foveal pit was restored, and CFT was normalized.

spontaneous resolution, was observed using OCT. Follow-up observation can be considered in cases involving ERMs with pre-existing PVD.

Patient consent

The patient consented to publication of the case in writing.

Meeting presentation

This manuscript has not been published or presented elsewhere in part or entirety and is not under consideration by another journal.

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Authorship

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CRediT authorship contribution statement

Masanori Kanai: Conceptualization, Data curation, Writing – original draft, Writing – review & editing. **Susumu Sakimoto:** Conceptualization, Project administration, Writing – original draft, Writing – review & editing. **Kohji Nishida:** Conceptualization, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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