

CASE REPORT

Eccentric Macular Hole after Pars Plana Vitrectomy for Epiretinal Membrane Without Internal Limiting Membrane Peeling: A Case Report

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ABSTRACT

Introduction: Postoperative eccentric macular hole formation is an uncommon complication after pars plana vitrectomy (PPV) without internal limiting membrane (ILM) peeling for the treatment of epiretinal membrane (ERM). We present a case of eccentric macular hole formation after PPV for ERM without ILM peeling.

Case report: A 68-year-old male patient presented with ERM and visual acuity of 6/24 in his left eye. He underwent 23-gauge PPV without ILM peeling for treatment of ERM. One week postoperatively the retina was attached and the epiretinal membrane was successfully removed, while visual acuity was 6/9. One month after PPV, a single eccentric retinal hole below the macula was detected using fundoscopy and subsequently confirmed by optical coherence tomography. At this time the visual acuity was

6/9 and the patient reported no symptoms. No further intervention was attempted and at the 9-month follow-up, the visual acuity and the size of the eccentric macular hole remained stable.

Conclusion: Eccentric macular holes can be developed after PPV even without ILM peeling and are usually managed conservatively by observation.

Keywords: Eccentric; Epiretinal membrane; Macular hole; Vitrectomy

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INTRODUCTION

Epiretinal membrane (ERM) and macular hole (MH) surgeries are among the most common posterior segment operations and are recognized as achieving good anatomical and functional results, due especially to advances in surgical techniques [1]. Postoperative complications of pars plana vitrectomy (PPV) for ERM and MH include the development of cataract, ERM recurrence, MH reopening, infection, retinal breaks and retinal detachment [1]. Postoperative eccentric MH formation is a relatively rare complication after PPV that has been described after internal limiting membrane (ILM) peeling for ERM or MH treatment [2]. Rubinstein et al. [2] were the first to observe and report iatrogenic eccentric MHs, and since then only a few cases have been reported [3–10]. The

incidence of eccentric MHs ranges between 0.6 and 2.5%. They can be located centrally, paracentrally or eccentrically and are usually single, although multiple MHs have been also observed [2–10].

Paracentral MHs were not reported prior to the advent of the ILM peeling technique, and it is believed that these MHs are associated with ILM dissection [2–10]. Herein, we present a case of eccentric MH formation after PPV for ERM treatment without ILM peeling.

CASE REPORT

A 68-year-old male patient with no ophthalmological or medical history indicative of eye disease presented with blurred vision and metamorphopsia in his left eye. At presentation, his best-corrected visual acuity (BCVA) was 6/9 in the right eye and 6/24 in the left eye. Intraocular pressure was 14 mmHg, and anterior segment slit-lamp examination was unremarkable in both eyes. Dilated funduscopy revealed ERM in the left eye, confirmed by optical coherence tomography (OCT) (Fig. 1a). The patient was counseled on the therapeutic alternatives, following which he was referred for PPV for treatment of ERM.

The patient underwent 23-gauge PPV using the CONSTELLATION® Vision System (Alcon, Novartis Int AG, Hünenberg, Switzerland). Core vitrectomy was followed by the surgical creation of posterior vitreous detachment (PVD), while Membrane Blue (Blue 018HD; high-density 0.18% trypan blue; Al.Chì.Mi.A. S.r.l., Ponte San Nicolò, PD, Italy) was used to stain the epiretinal tissue that was removed easily with end gripping forceps. Removal of the ILM was not attempted. The peripheral retina was inspected carefully to exclude the presence of iatrogenic retinal tears. At the end of the surgery intraocular tamponade was not used in the absence of any retinal breaks.

One week postoperatively the retina was attached and ERM was successfully removed (Fig. 1b); the BCVA was 6/9. It should be noted that OCT at this time revealed the presence of a hyperreflective area in the inner retinal layers, which most likely was a first sign of

disorganization of the inner retinal layers. One month after PPV, there was a single eccentric MH, which was detected by funduscopy and confirmed by OCT (Fig. 1c); this MH corresponded to the hyperreflective area observed on the OCT scan at the previous visit. The BCVA was 6/7.5, and the patient reported no symptoms. The patient was informed about the presence of the eccentric MH, but no additional intervention was attempted at this time. At the 9-month follow-up, no change in the size of the eccentric MH was noted and no complications occurred.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964, as revised in 2013. Informed consent was obtained from the patient for reporting this case.

DISCUSSION

We have reported the case of an eccentric MH that was developed about 1 month after PPV without ILM peeling for the treatment of ERM. This case is very similar to one previously described [10] in which the authors reported the presence of a postoperative eccentric MH after PPV. Although we draw on the content of this previous publication, we focused on the formation of an eccentric MH after PPV without ILM peeling.

Several theories have been proposed to explain the pathogenesis of postoperative eccentric MH formation, but there is as yet no general consensus. Intraoperative iatrogenic trauma, which can occur when the ILM is grasped with forceps, is the most plausible mechanism [2]. ILM peeling may result in damage to the nerve fiber layer and Müller cells, causing secondary delayed degeneration of the adjacent retinal neurons [2, 4, 8]. In addition, removal of the ILM may produce glial apoptosis and reduced retinal function due to removal of Müller cells, leading initially to weakening of the glial structure and consequently to the development of MHs [2, 8]. However, in the majority of published cases,

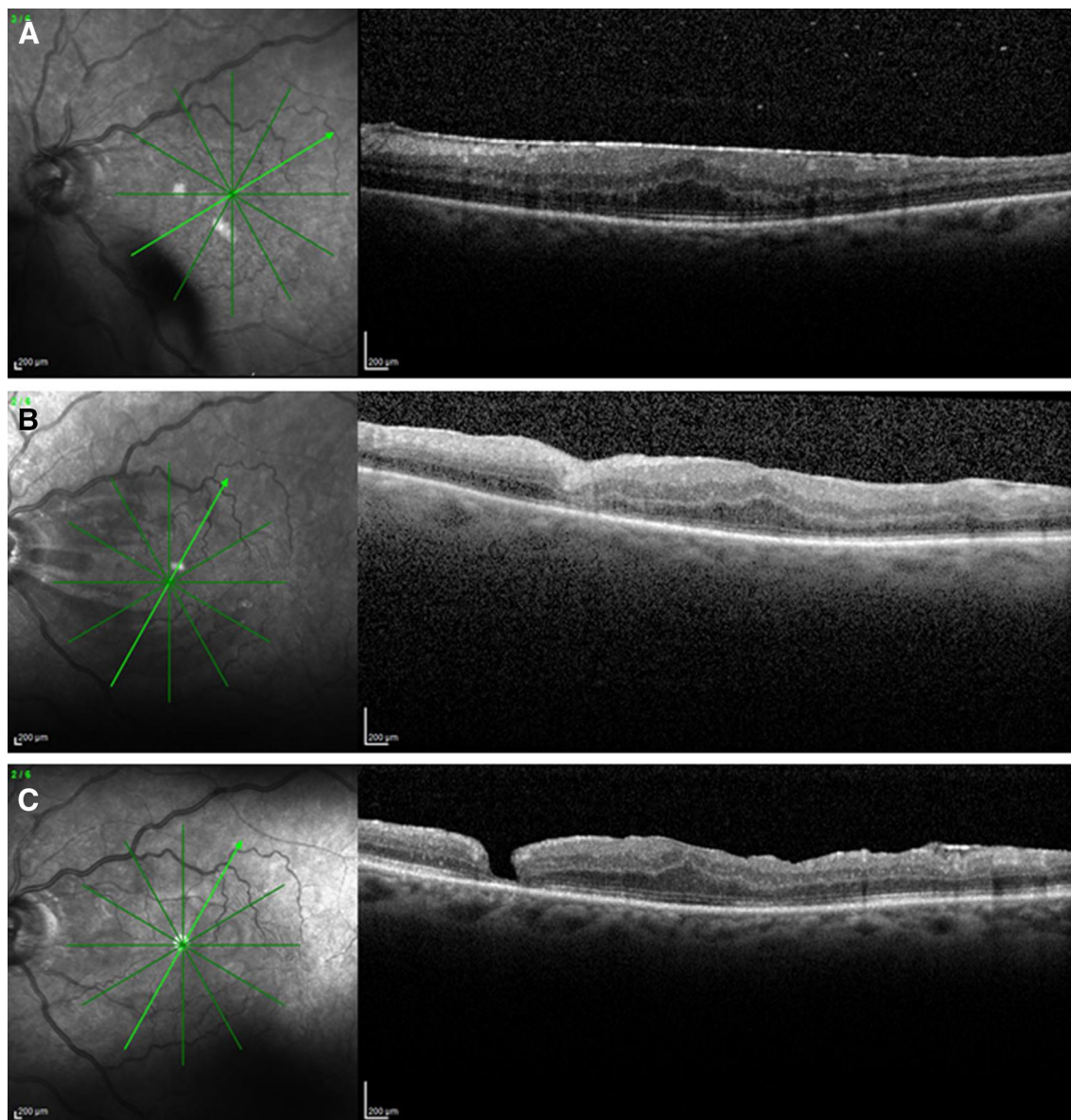


Fig. 1 **a** B-scan optical coherence tomography (OCT), showing the epiretinal membrane (ERM) at baseline. **b** B-scan OCT of the same patient 1 week after successful pars plana vitrectomy, showing removal of ERM and hyperreflective area in the inner retinal areas. **c** B-scan

OCT, showing eccentric macular hole formation 1 month postoperatively

neither retinal whitening nor retinal hemorrhage consistent with postoperative trauma was reported [2, 4, 9].

Although ILM peeling seems to be the likeliest possibility to induce the development of eccentric MHs, the latter can occur in the absence of ILM peeling, as occurred in our case

and also in the case published by Sandali et al. who reported the development of a paracentral MH in a patient who did not undergo ILM peeling in ERM surgery [4]. In such cases, retinal damage could arise from the use of retinal blade for removal of the ERM or, possibly, from the retinal traction produced by the firm perifoveal

adherence of the hyaloid membrane during ERM removal [4]. It is worth noting that a hyperreflective area in the inner retinal layers was observed on the OCT scan of our case 1 week postoperatively, probably as an early sign of disorganization of the inner retinal layers due to potential iatrogenic trauma or due to the traction induced by ERM removal, since this area corresponded to the area where the MH subsequently developed.

Interestingly, the toxic effect of dyes used for ILM staining or for ERM staining could be also considered as a possible cause for eccentric MH development. However, indocyanine green (ICG) toxicity usually concerns the retinal pigment epithelium and is not associated to the formation of MHs. Additionally, the development of postoperative MHs after ILM removal irrespective of the dye used (i.e. ICG, trypan blue, brilliant blue, triamcinolone) has been noted [2, 8–10].

Another interesting observation is that eccentric MHs seem to have minimal impact on the patient's visual function, since they are usually located far from the fovea (diameter > 1 disk). Therefore, in terms of future interventions for the treatment of eccentric MHs, three factors need to be considered: the visual acuity, the location of the MHs and the evolution in size of the MHs [10]. Eccentric MHs usually remain stable and do not require further intervention. However, if the postoperative MH is located near the fovea or enlarges over time and if the visual acuity decreases, surgical treatment may be recommended with gas tamponade and probably additional ILM peeling to allow MH closure [2, 4]. In our case, no further intervention was needed, and both the visual acuity and the size of the MH had remained stable at the 9-month follow-up.

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Compliance with Ethics Guidelines. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964, as revised in 2013. Informed consent was obtained from the patient for reporting this case.

Data Availability. The data are available from the corresponding author upon reasonable request.

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