Postoperative multiple eccentric macular holes after pars plana vitrectomy for lamellar macular hole: A case report

Ece Ozal[1], *Murat Karapapak*[1], *Serhat Ermis*[1], *Yusuf Cem Yilmaz*[1], *Serife Ciloglu Hayat*[1], *Sadik Altan Ozal*[1]

ABSTRACT

Postoperative retinal holes may be located centrally or extrafoveally and may be either full-thickness holes or lamellar hole. We describe a case of a case who had multiple eccentric macular holes (MH) occurring as a consequence of pars plana vitrectomy (PPV) surgery for lamellar MH with epiretinal membrane (ERM). A 65-year-old man who presented to us with progressive right eye vision deficiency. Optical coherence tomography (OCT) examination revealed a lamellar MH with ERM in the right eye and normal in the left eye. We performed PPV surgery in the right eye with internal limiting membrane (ILM) peeling, with 20% sulphur hexafluoride gas endotamponade. At the postoperative second week follow-up, >20 holes MHs were observed in the temporal region of the macula on OCT imaging and wide-field fundus photography. The pathogenesis of macular holes in this study is most consistent with contraction of the remaining edge of ILM.

Keywords: Eccentric macular hole, epiretinal membrane, lamellar macular hole, pars plana vitrectomy, internal limiting membrane peeling.

INTRODUCTION

Eccentric macular hole (MH) formation is a rare complication after pars plana vitrectomy (PPV) that has been first described after internal limiting membrane (ILM) peeling for epiretinal membrane (ERM) or MH surgery[1], and since then only a few cases have been reported.[2-4] Although the exact underlying mechanism is not known, it is thought that several of factors such as Muller cell damage while peeling ILM/ERM, iatrogenic mechanical trauma, indocyanine green toxicity, phototoxicity, and residual ILM/ERM contraction may be responsible.[5,6] Postoperative eccentric MHs are usually single, but multiple MHs have also been reported[7]

We present a case who had multiple eccentric MHs occurring as a consequence of pars plana vitrectomy (PPV) surgery for lamellar MH with ERM in approximately 2 weeks.

CASE REPORT

A 65-year-old man presented to us with progressive right eye vision deficiency. There was no known systemic disease. At first examination, the best-corrected visual acuity (BCVA) was in the right eye 8/20 and 20/20 in the left eye. Intraocular pressure (IOP) was 14 mm Hg at the right eye, and 15 mm Hg at the left eye with a Goldmann applanation tonometer. There was corticonuclear cataract in the right eye and the left eye was pseudophakic. Optical coherence tomography (OCT) examination revealed a lamellar MH with ERM in the right eye and normal in the left eye (Figure 1A).

25-gauge (G) combined phacovitrectomy (phacoemulsification and PPV), and single-piece hydrophobic acrylic intraocular lens implantation was performed on his right eye. 25 G PPV operation was performed with Infinity Constellation (Alcon, TX, USA) device. After core vitrectomy, the posterior hyaloid was stained with triamcinolone acetonide (2.5 mg/ml) and

1- Department of Ophthalmology, Başakşehir Çam Sakura State Hospital, Istanbul, Türkiye

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Correspondence author:
Ece Ozal
Email: ecemansuroglu@hotmail.com

separated from the retina with the help of the ocutome. ERM and ILM were stained with membrane blue-dual dye (DORC, Zuidland, Netherlands) applied for 30 seconds under fluid. ERM and ILM peeling was performed with serrated Grieshaber microforceps (Alcon, Fort Worth, TX, USA.) 20% sulfur hexafluoride gas was used as the endotamponade.

In the postoperative period, 0.5% topical moxifloxacin was applied for 2 weeks, and 1% topical prednisolone acetate was applied for 1 month. At postoperative 1 week, BCVA was 20/200 in the right eye, the lamellar MH was closed while intraocular gas tamponade was still present. At the postoperative second week follow-up, BCVA was 20/32 in the right eye. While the lamellar MH was observed to be closed (Figure 1B), multiple MHs were observed in the temporal region of the macula on OCT imaging (Figure 1C), color fundus (Figure 2A), and wide-field fundus photograph (Figure 2B).

Three months after the operation, multiple eccentric holes have no demonstrable effect on BCVA. No intervention was considered necessary during the follow-up and no complications developed.

CONCLUSION

Postoperative MH formation after ILM peeling is a rare complication described in few studies. Most of the cases reported in this way described the presence of a single MH located in the foveal area or extrafoveal.[1] Brouzas et al. encountered 4 extrafoveal holes in one of their patients.[7] A single hole occurred 1 week after vitrectomy temporal to fovea for ERM peeling and, three additional eccentric holes appeared close to the first 15 weeks late. Steven et al. presented two cases of multiple holes found 10 weeks after a failed MH operation in one case and 3 weeks after vitrectomy for ERM in the second case.[5] As far as we know, there is no other case report with >20 holes in the literature. Almost all of these holes developed in the extrafoveal area within 2 weeks and the patient did not have any visual complaints after these holes were formed.

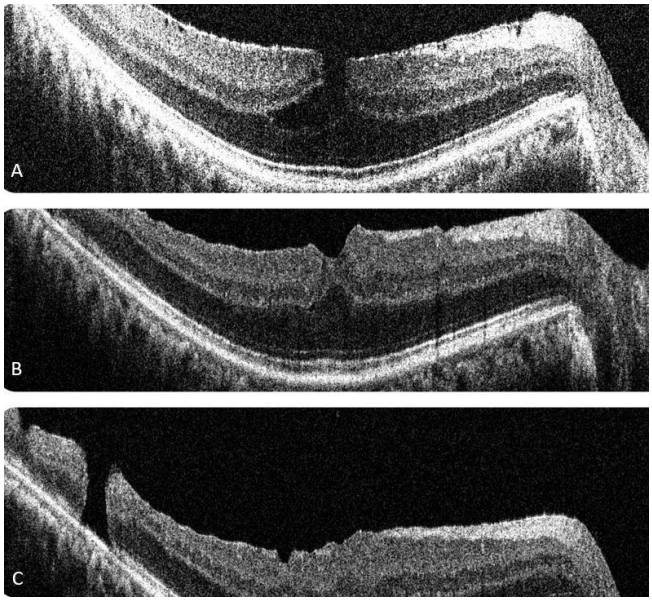

Figure 1: *OCT demonstrating preoperative and postoperative findings. A. Preoperative erm and lamellar MH. B. Closed lamellar MH after ERM and ILM removal. C. One eccentric MH image in OCT scan.*

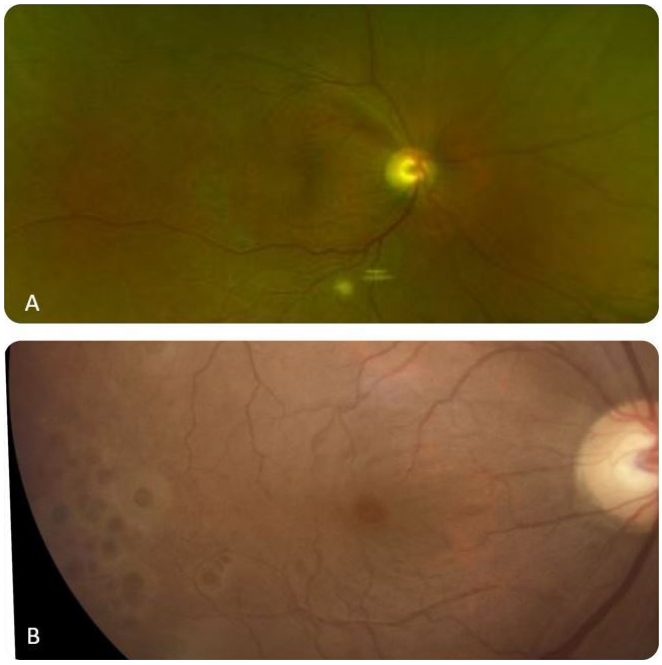

Figure 2: *Fundus photograph of eccentric holes. A. Wide-field fundus photograph B. Color fundus photograph.*

It has been suggested that eccentric MHs may represent trauma to the retina due to involvement with ILM forceps either at the initial site of the ILM elevation or by subsequent regrasping of the membrane.[1] However, in the presented case, no evidence of surgical trauma is observed in the retina in the region corresponding to multiple extrafoveal MHs (Figure 3), by reviewing the surgical notes and surgical video recordings. Furthermore, in the presented case, the starting point of pucker and ILM removal was inferior, while eccentric MHs were temporal and inferotemporal. It does not seem to support this recommendation for the pathogenesis of MHs.

From a different perspective, peeling of the ILM and/or ERM could traumatize the Müller cells beneath these membranes and cause secondary delayed degeneration of

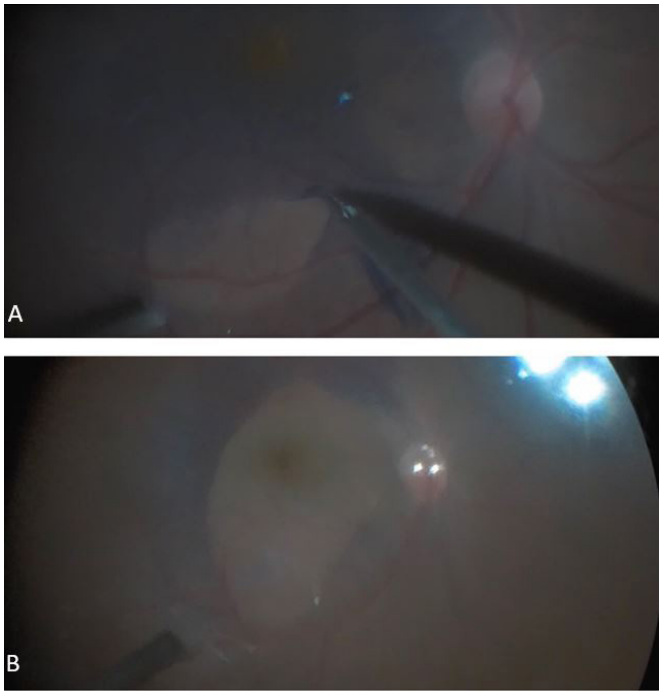

Figure 3*: Intraoperative images A. Starting point of pucker and ILM removal. B. ERM and ILM removal area and eccentric holes do not appear to be related.*

adjacent retinal neurons. Histopathological findings have shown fragments of Muller cell processes attached to the removed ILM with signs of necrosis.[8] Since the main function of Muller cells is to maintain the stability of the neural retina, glial apoptosis could cause photoreceptor cell damage and MHs. However, the paracentral MHs in this case occurred not inside the peeled zone, at the limits of the area of ILM peeling.

We believe that the main potential cause of eccentric MH formation may be contracture at the edge of the peeled ERM or ILM. The holes that developed in our case were located at the borders of the ILM peeling area. On postoperative OCT images, we observed an epimacular membrane temporally to the primary MH. The presence of the epimacular membrane and tangential traction to the macula may then explain the secondary occurrence of the eccentric hole in this condition.[9] Clearly, epiretinal scar tissue formation and subsequent traction tendency in macular pucker eyes support our theory in this regard.

In summary, more than twenty eccentric MHs resulting from PPV surgery for lamellar MH with ERM have been reported for the first time to our knowledge. In addition, indocyanine green dye was not used in the surgery of our patient. We believe that the pathogenesis of multiple MHs in the presented case is related to contraction of the residual ILM induced by ILM peeling or secondary epimacular proliferation. As we mentioned in our discussion, there are many theories regarding the etiology of these postoperative eccentric MHs, but there is no consensus yet.

REFERENCES

1. Rubinstein A, Bates R, Benjamin L, Shaikh A. Iatrogenic eccentric full thickness macular holes following vitrectomy with ILM peeling for idiopathic macular holes. Eye (Lond) 2005;19:1333-5. https://doi.org/10.1038/sj.eye.6701771
2. Rush RB, Simunovic MP, Aragon AV, Ysasaga JE. Postoperative macular hole formation after vitrectomy with internal limiting membrane peeling for the treatment of epiretinal membrane. Retina 2014;34:890-6. https://doi.org/10.1097/IAE.0000000000000034
3. Garnavou-Xirou C, Xirou T, Kabanarou S, Gkizis I, Velissaris S, Chatziralli I. Eccentric macular hole after pars plana vitrectomy for epiretinal membrane without internal limiting membrane peeling: A case report. Ophthalmol Ther 2017;6:391-5. https://doi.org/10.1007/s40123-017-0113-7
4. Yetkin E, Citirik M, Teke MY, Kiziltoprak H. Postoperative eccentric macular holes after surgery for vitreomacular interface diseases. Int Ophthalmol 2020;40:591-6. https://doi.org/10.1007/s10792-019-01217-2
5. Steven P, Laqua H, Wong D, Hoerauf H. Secondary paracentral retinal holes following internal limiting membrane removal. Br J Ophthalmol 2006;90:293-5. https://doi.org/10.1136/bjo.2005.078188
6. Sandali O, El Sanharawi M, Basli E, et al. Paracentral retinal holes occurring after macular surgery: incidence, clinical features, and evolution. Graefes Arch Clin Exp Ophthalmol 2012;250:1137-42. https://doi.org/10.1007/s00417-012-1935-6
7. Brouzas D, Dettoraki M, Lavaris A, Kourvetaris D, Nomikarios N, Moschos MM. Postoperative eccentric macular holes after vitrectomy and internal limiting membrane peeling. Int Ophthalmol 2017;37:643-8. https://doi.org/10.1007/s10792-016-0320-6
8. Wolf S, Schnurbusch U, Wiedemann P, Grosche J, Reichenbach A, Wolburg H. Peeling of the basal membrane in the human retina: ultrastructural effects. Ophthalmology 2004;111:238-43. https://doi.org/10.1016/j.ophtha.2003.05.022
9. Mason JO, Feist RM, Albert MA. Eccentric macular holes after vitrectomy with peeling of epimacular proliferation. Retina 2007;27:45-8. https://doi.org/10.1097/01.iae.0000256661.56617.69