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1 **Spontaneous Lamellar Macular Holes Closure**

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21 **Key words:** epiretinal proliferation (ERP), lamellar hole-associated epiretinal
22 membrane (LHEP), lamellar macular hole (LMH), Müller glial cells, spectral-domain
23 optical coherence tomography (SD-OCT).

24

25 **Summary statement:**

26 Lamellar macular hole is a macular lesion characterized by a partial thickness foveal
27 defect and commonly associated with epiretinal proliferation. In this report we
28 present two cases of spontaneous closure of lamellar macular holes by extension of
29 epiretinal proliferation filling the retinal defect.

30

31 **ABSTRACT:**

32 **Purpose:** To report two cases of spontaneous closure of lamellar macular holes
33 (LMH) with epiretinal proliferation (ERP).

34 **Methods:** Observational cases report.

35 **Results:** Two patients affected with LMH showed progressive and spontaneous
36 closure of the hole associated with ERP development. At presentation, both patients
37 presented with irregular foveal contour, and foveal cavitation with apparent loss of
38 retinal tissue. In both cases, ERP, also called “lamellar hole-associated epiretinal
39 proliferation” (LHEP), was present and increased in size over time. This proliferation
40 progressively developed across the hole with apparent restoration of the foveal
41 contour and preservation of visual acuity.

42 **Conclusion:** This report describes two cases of LMH in which ERP increased over
43 time, resulting in LMH closure. Such observations may suggest a spontaneous
44 healing process driven by glial cell proliferation.

45 **INTRODUCTION**

46 Lamellar macular hole (LMH) is characterized by an irregular foveal contour
47 with partial thickness retinal defect as seen on optical coherence tomography
48 (OCT).^(1,2) The pathophysiology of LMH remains poorly understood with suggestions
49 of an abnormal vitreoretinal interface and/or retinal degenerative processes playing
50 a role.^(3,4) The natural history of LMH includes the enlargement of the foveal
51 cavitation and progressive disruption of the ellipsoid zone resulting in visual acuity
52 loss.⁽⁴⁾ Pang et al. first noted that LMH is frequently associated with an epiretinal
53 proliferation (ERP), which they initially named “lamellar hole-associated epiretinal
54 proliferation” (LHEP).⁽⁵⁾ This dense material differs from conventional epiretinal
55 membrane by the absence of contractile activity and appears on spectral-domain
56 OCT (SD-OCT) as a thick, iso-reflective, epiretinal material.⁽⁶⁾ Although the
57 pathogenesis of ERP remains unclear, some authors hypothesized that it may be the
58 result of a healing process.⁽⁵⁾ Here we report two cases of LMH showing spontaneous
59 restoration of foveal contour with ERP increase over an extended follow-up period.

60

61 **CASE REPORTS**

62 **Case 1**

63 A 71-year-old gentleman was initially referred for a macula on
64 rhegmatogenous retinal detachment with multiple retinal tears in his pseudophakic
65 left eye. He underwent a combined pars-plana vitrectomy with scleral buckle. At
66 postoperative month one, the retina was attached and his vision was 20/20 Snellen
67 equivalent without macular abnormalities on fundus examination. Three years later,

68 the patient presented complaining of vision loss in his operated eye (20/30 Snellen
69 equivalent). Examination of the posterior segment demonstrated an irregular foveal
70 defect and a diagnosis of LMH was confirmed with SD-OCT (Figure 1A). The foveal
71 contour appeared irregular with a partial thickness retinal defect and a disruption of
72 both external limiting membrane (ELM) and ellipsoidal zone (EZ). An ERP was noted
73 along the surface and the nasal internal edge of the lamellar hole (Figure 1A and
74 1B). Thirty-three months after the diagnosis of LMH, the proliferation had extended
75 across the prior hole with restoration of the foveal contour (Figure 1C). The
76 disruption of the ELM and EZ appeared to have improved over time. On clinical
77 examination, his vision slightly improved to 20/25 Snellen equivalent.

78 **Case 2**

79 A 88-year-old gentleman was evaluated for a mild non-proliferative diabetic
80 retinopathy. His visual acuity was 20/25 Snellen equivalent in his left eye. The
81 patient was pseudophakic and the anterior segment examination was
82 unremarkable. The posterior segment examination reported a blunted foveolar
83 reflex in the left eye, and a LMH was diagnosed with SD-OCT examination (Figure
84 2A). Epiretinal proliferation was noted along the surface and at the edges of the
85 LMH. Over time the proliferation progressively increased to completely filling the
86 foveolar defect (Figure 2B and 2C). Thirty-three months after the initial diagnosis of
87 LMH, the fovea had an apparent normal contour on SD-OCT (Figure 2D). His visual
88 acuity remained stable over the follow-up period at 20/25, and both ELM and EZ
89 appeared more regular compared to baseline examination.

90

91 **DISCUSSION**

92 We report two cases of LMH with an extended follow-up period, in which the
93 progression of ERP was associated with restoration of foveal anatomical contour and
94 preservation of visual acuity. Epiretinal proliferation is not an exclusive feature of
95 LMH as it has recently been associated with other retinal conditions such as full-
96 thickness macular hole, posterior uveitis, and epiretinal membranes.⁽⁷⁾ Therefore,
97 the term “epiretinal proliferation” (ERP) may be preferred instead of “lamellar hole
98 associated-epiretinal proliferation” or LHEP.⁽⁵⁾ This proliferation may originate from
99 inner retinal layers within the lamellar hole defect due to Müller cell proliferation.⁽⁵⁾
100 The exact pathogenesis of ERP is unknown but one theory is that the proliferation is
101 a reactive process to retinal injury.^(5,7)

102 Previous studies reported that visual acuity of LMH patients with ERP was
103 significantly worse than eyes without proliferation.^(6,8) However, in our cases, the
104 progressive increase in ERP did not impair visual acuity. In fact, the progression in
105 ERP correlated with restoration of foveal contour and ELM/EZ over time.
106 Remarkably, visual acuity remained stable over the follow-up period and even
107 slightly increased in the first case. This remodeling of foveal anatomy suggests a
108 spontaneous healing process such as the progressive growth of ERP over the foveal
109 surface.

110 Previous studies reported that the response of glial Müller cells to retinal injury
111 may be protective to retinal function with potential regeneration of all retinal cell
112 types including the photoreceptors.⁽⁹⁾ Hence, proliferation and migration of glial cells
113 present in the ERP may contribute to stabilization or regeneration of the retinal
114 layers including the photoreceptors. This could explain how the LMH patients in our
115 report showed preservation of visual acuity over their follow-up period.

116 Recommendations for surgical repair of LMH remains controversial.⁽¹⁰⁾ The two
117 cases reported here may argue for observation given the possibility of spontaneous
118 improvement. However, in cases where there is progressive decrease of vision with
119 enlargement of the LMH and/or an increase of EZ disruption over time, surgical
120 intervention might be considered. If a vitrectomy is performed, potential benefit of
121 ERP noted in our cases support recent publications suggesting to use this
122 proliferation to fill the hole at the end of the surgical procedure.⁽¹¹⁾

123 In 2012, using time-domain OCT, Theodossiadis et al. reported also two cases of
124 spontaneous closure of what they named LMH.⁽¹²⁾ However, in this paper both
125 patients showed a contractive ERM with no ERP. The authors attributed the
126 favorable evolution to the spontaneous avulsion of the ERM with subsequent release
127 of traction. In the present report, our both cases already had a posterior vitreous
128 detachment and lacked a tractional ERM at baseline. The restoration of foveal
129 profile involved the development of additional tissue, i.e epiretinal proliferation,
130 thought to be a gliosis reaction in response to the loss of retinal tissue. A similar
131 observation has recently been reported by Cutler and Singh, who also showed
132 resolution of a LMH by extension of ERP.⁽¹³⁾ These different mechanisms highlight
133 the distinctive pathogenesis between “tractional lamellar macular hole”, and
134 “degenerative lamellar macular hole” which lacks tractional properties, as seen
135 here in our two patients.⁽⁴⁾

136 In this report we describe two patients with LMH and progressive increase of ERP
137 leading to spontaneous anatomical restoration of the foveal contour on SD-OCT,
138 partial recovery of outer retinal layers, and preservation of the visual acuity.

139 REFERENCES

- 140 1. Gass JD. Lamellar macular hole: a complication of cystoid macular edema after
141 cataract extraction: a clinicopathologic case report. *Trans Am Ophthalmol Soc.*
142 1975;73:231-250.
- 143 2. Haritoglou C, Tadayoni R, Hubschman J-P. Lamellar macular hole surgery - current
144 concepts, future prospects. *Clin Ophthalmol.* 2019;13:143-146.
- 145 3. Gaudric A, Aloulou Y, Tadayoni R, Massin P. Macular pseudoholes with lamellar
146 cleavage of their edge remain pseudoholes. *Am J Ophthalmol.* 2013;155(4):733-
147 742.
- 148 4. Govetto A, Dacquay Y, Farajzadeh M, et al. Lamellar macular hole: two distinct
149 clinical entities? *Am J Ophthalmol.* 2016;164:99-109.
- 150 5. Pang CE, Spaide RF, Freund KB. Epiretinal proliferation seen in association with
151 lamellar macular holes: a distinct clinical entity. *Retina.* 2014;34(8):1513-1523.
- 152 6. Pang CE, Spaide RF, Freund KB. Comparing functional and morphologic
153 characteristics of lamellar macular holes with and without lamellar hole-associated
154 epiretinal proliferation. *Retina.* 2015;35(4):720-726.
- 155 7. Itoh Y, Levison AL, Kaiser PK, et al. Prevalence and characteristics of
156 hyporeflective preretinal tissue in vitreomacular interface disorders. *Br J*
157 *Ophthalmol.* 2016;100(3):399-404.
- 158 8. Compera D, Schumann RG, Cereda MG, et al. Progression of lamellar hole-
159 associated epiretinal proliferation and retinal changes during long-term follow-up. *Br*
160 *J Ophthalmol.* 2018;102(1):84-90.

- 161 9. Lenkowski JR, Raymond PA. Müller glia: stem cells for generation and
162 regeneration of retinal neurons in teleost fish. *Prog Retin Eye Res.* 2014;40:94-123.
- 163 10. Figueroa MS, Govetto A, Steel DH, et al. Pars plana vitrectomy for the treatment
164 of tractional and degenerative lamellar macular holes: functional and anatomical
165 results. *Retina* 2019;39(11):2090-2098.
- 166 11. Shiraga F, Takasu I, Fukuda K, et al. Modified vitreous surgery for symptomatic
167 lamellar macular hole with epiretinal membrane containing macular pigment.
168 *Retina.* 2013;33(6):1263-1269.
- 169 12. Theodossiadis PG, Grigoropoulos VG, Emfietzoglou I, et al. Spontaneous closure
170 of lamellar macular holes studied by optical coherence tomography. *Acta*
171 *Ophthalmol.* 2012;90(1):96-98.
- 172 13. Cutler NE, Singh RP. Spontaneous closure of lamellar macular hole with
173 epiretinal proliferation. *Ophthalmol Retina.* 2019;3(11):997.

174 **FIGURES LEGENDS**

175 **Figure 1.** Case 1. Horizontal spectral-domain optical coherence tomography (SD-
176 OCT) scans over the follow-up period. At baseline SD-OCT imaging showed a
177 lamellar macular hole (LMH) (empty arrowheads) with epiretinal proliferation (ERP)
178 over the surface of the retina (arrows) (A). Large disruption of external limiting
179 membrane and ellipsoidal zone layers were noted above the retinal defect (B).
180 Thirty-three months later, the LMH was filled by the ERP which appears as an
181 isorefective tissue (arrows). The SD-OCT showed a regular foveal contour with
182 improvement of photoreceptors defect (C).

183

184 **Figure 2.** Case 2. Spectral-domain optical coherence tomography (SD-OCT) scans
185 showed initially a lamellar macular hole (LMH) visible as a partial thickness foveal
186 defect (arrowheads) with epiretinal proliferation (ERP) (arrows) (A). The area of
187 proliferation progressively increased over time (arrows) and filled the retinal defect
188 (arrowheads) (B and C). At the last examination the foveal contour appeared regular
189 with isorefective proliferation (arrows) overlying the previous foveal defect and
190 over the surface of the retina (D). Outer retinal layers were noted to be improved
191 from baseline to final examination (A and D).