Journal of Clinical Medicine

Open access

Mini Review

Clinical and Functional Characteristics in ERM, MPH, ERM-FS, and LMH

Noriko Kubota*

*****Department of Ophthalmology, Nippon Medical School Hospital, Nippon Medical School, Tokyo, Japan*

***Correspondence:** Noriko Kubota, Department of Ophthalmology, Nippon Medical School Hospital, Nippon Medical School, Tokyo, Japan, E-mail: oishinoriko@nms.ac.jp, DOI: 10.1042/JCM.5.1.0020

Abstract

Epiretinal membrane (ERM), macular pseudo hole (MPH), epiretinal membrane foveo schisis (ERM-FS), and lamellar macular hole (LMH) are vitreomacular interface-related disorders that share overlapping optical coherence tomography (OCT) features but demonstrate distinct clinical and functional characteristics. Accurate differentiation among these entities is essential for understanding disease mechanisms, predicting visual outcomes, and determining optimal surgical timing. We conducted a comparative analysis of these four macular disorders, focusing on both structural and functional parameters.

Keywords: Epiretinal membrane, Lamellar macular hole, Optical coherence tomography, Epiretinal proliferation

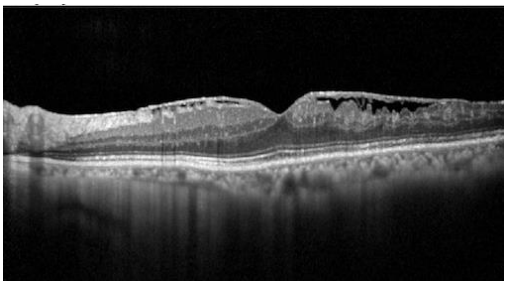
Received date: December 14, 2025; **Accepted date:** December 24, 2025; **Published date:** December 31, 2025

Citation: Noriko Kubota (2025) Clinical and Functional Characteristics in ERM, MPH, ERM-FS, and LMH. JCM, 5: 1.

Introduction

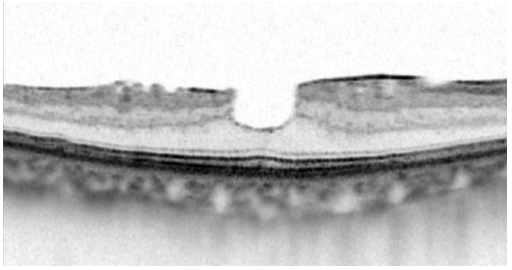
We retrospectively reviewed patients who underwent vitrectomy and classified all eyes into four groups-ERM, MPH, ERM-FS, and LMH-based on newly defined OCT diagnostic criteria (Figure). Age, sex, presence of glaucoma, preoperative spherical equivalent, axial length (AL), preoperative and postoperative best-corrected visual acuity (BCVA), metamorphopsia assessed using M-CHARTS®, and the frequency of overlapping associated macular conditions were evaluated. In addition, associations between pre-and postoperative BCVA and these clinical factors were analyzed.

ERM



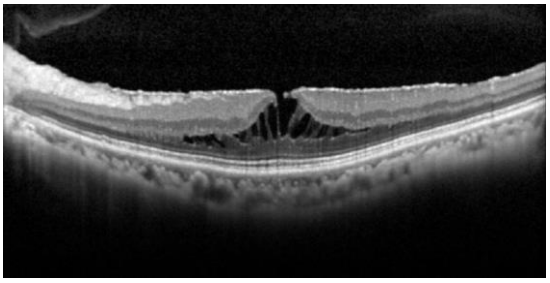
- The presence of an irregular and hyperreflective layer over the inner limiting membrane.

MPH



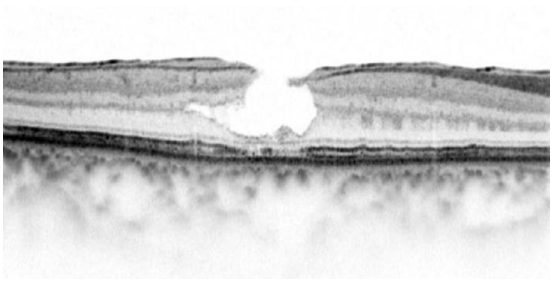
- Foveal centre sparing retinal thickening verticalised or steepened foveal profile.

ERM-FS



- Contractile ERM foveoschisis at the level of Henle's fiber layer.

LMH



- Irregular foveal contour foveal cavity with undermined edges presence of at least one other sign evoking a loss of foveal tissue.

Figure 1: OCT features of ERM-related foveal disorders, (A) ERM, (B) macular pseudo hole, (C) ERM-associated foveo schisis, and (D) lamellar macular hole, highlighting characteristic foveal contour changes and tissue alterations.

Literature Review

In this study, patients with ERM demonstrated significantly better BCVA compared with those with LMH. Notably, a high frequency of overlapping LMH-related conditions was observed. This finding suggests that diagnostic classification may vary depending on OCT acquisition methods, such as whether B-scan or radial scan protocols are used, as well as on the number of cross-sectional images evaluated. Although updated diagnostic criteria for LMH-related disorders have been established, our results indicate that careful interpretation of OCT images remains essential in clinical practice.

Furthermore, eyes with LMH-related disorders exhibited significantly longer axial length compared with those with ERM, suggesting that myopia may represent a potential risk factor for the development of LMH-related pathology.

Structural biomarkers on OCT further differentiated these conditions. Disruption of the ellipsoid zone (EZ) was most frequently observed in LMH, reflecting greater outer retinal involvement and photoreceptor damage. Epiretinal proliferation (EP), which has been proposed as a hallmark of degenerative LMH, was also predominantly observed in the LMH group.

Discussion & Conclusion

These findings suggest that LMH may involve a pathophysiology distinct from that of MPH and ERM-FS. While MPH and ERM-FS are thought to be primarily driven by tractional forces associated with ERM, LMH may be more closely related to tissue degeneration. EP is believed to originate from Müller cells in response to retinal tissue injury, supporting the hypothesis that tissue damage rather than traction plays a central role in LMH development.

Our findings support the concept that ERM, MPH, ERM-FS, and LMH represent a spectrum of macular disorders with differing contributions from tractional and degenerative mechanisms.

In summary, this comparative study provides clinically meaningful insights into the structural and functional differences among ERM-related macular disorders. By integrating OCT-based morphology with functional assessment, it emphasizes the importance of precise phenotyping to guide prognosis, patient counseling, and management strategies.