

Does Inverted Internal Limiting Membrane Flap Technique for Stage 4 Macular Holes Result in Reconstitution of Outer Retinal Layers?

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Introduction: Unsatisfactory anatomical outcomes have been reported following conventional internal limiting membrane (ILM) peel technique for large macular holes (MHs); therefore, the inverted ILM flap technique was invented.^{1,2} This involves the inversion of peeled ILM around the MH into it. This technique provides better anatomical hole closure rates for the repair of difficult, large macular holes > 400microns.^{3,4} There is a question regarding the degree of outer retina reconstruction occurring after this technique. The aim of this study was to determine the degree of outer retina reconstruction (EZ - Ellipsoid Zone and ELM - External Limiting Membrane) in eyes, which have undergone the inverted ILM flap technique for the repair of large MHs, >400microns as determined by Spectral Domain Optical Coherence Tomography (SD OCT) imaging.

Methods: A retrospective non-comparative single surgeon review of preoperative and postoperative SD OCT images using n=14 consecutive eyes of 14 patients who had surgery between April 2015 and Jan 2017. Standard surgery was a 23G pars plana vitrectomy (PPV) and dye assisted ILM peel with duoblu. Tamponade used was sulfur hexafluoride (SF6), perfluoropropane(C3F8) gases and air. All 14 eyes had serial SD OCT & 2 cases OCT Angiography.

Patients: F: 8 M: 6. Average Age: 62years (47 to 76years). RE 6; LE 8.

Symptom duration: 1 to 60 months (Average 16 months). Seven myopes.

MHs were categorized based on MH base diameter.

- A: < 500 microns 1 eye.
- B: 500 – 1000microns 7 eyes.
- C: > 1000 microns 6 eyes.

Results: 100% anatomical MH closure rate.

Visual improvement was noted in 9 eyes, remained the same in 3 eyes and reduced in 2 eyes (consequent to cataract progression). Outer retina reconstruction was assessed by postoperative SD OCT for presence of subfoveal and parafoveal ELM and IS/OS (EZ). Present - P or Absent - A. If Present; it could be, Continuous - PC (subfoveal component continuous with parafoveal) or Broken - PB (subfoveal component discontinuous with the parafoveal).

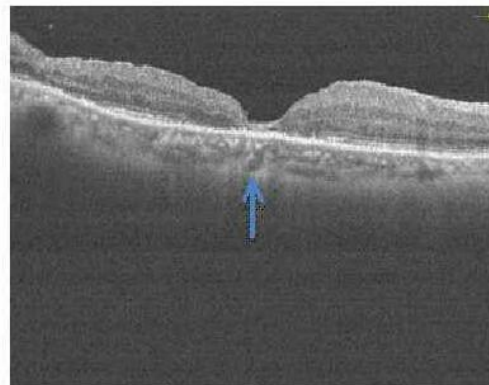


Fig. 1: Absent -(A) ELM and EZ

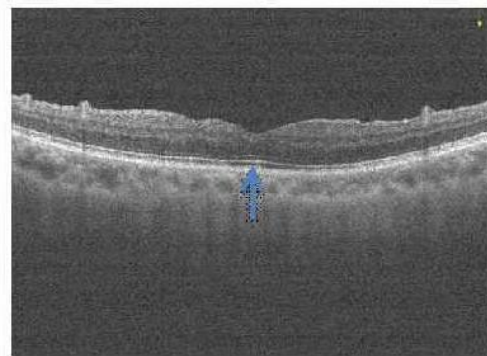


Fig. 2: Present continuous -(PC) ELM and EZ

Absent: A. 6 eyes.

Present (Broken): PB. 4 eyes.

Present (Continuous): PC. 4 eyes.

Average MH base diameter for n=14: 965microns; for 6 absent eyes (A)= 1242microns, for 4 PB eyes = 855microns and for 4 PC eyes = 652microns.

Statistical analysis showed a correlation between preoperative MH size and presence or absence of EZ and ELM, p= 0.04 (<0.05).

Discussion: The outer retina has been shown to be a predictor of visual outcome as it contains the photoreceptors, which are essential for vision.^{5,6} The reconstitution of the outer retina in these large sized MHs implies a functional improvement in vision is anticipated aside from anatomical success. There is a need to develop other techniques other than the inverted ILM flap for repair of such very large MHs with a lower probability of postoperative outer retina presence. The present study categorizes these MHs to be those with preoperative MH base diameter >1000microns. Perhaps the autologous retina transplant may hold a future for this subset of very large MHs.⁷

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