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### SHORTFALLS OF FREE AUTOLOGOUS INTERNAL LIMITING MEMBRANE TRANSPLANTATION FOR HIGHLY MYOPIC REFRACTORY MACULAR HOLES IN A LONG TERM FOLLOW-UP

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#### Introduction:

In high-income countries, degenerative myopia is a leading cause of legal blindness. [1] The spectrum of the myopic traction maculopathy (MTM), which includes inner and outer retinal schisis, foveal detachment, and lamellar or full-thickness highly myopic macular holes (HMMHs), is determined by the excessive elongation of the globe. In fact, in the posterior staphyloma, the anteroposterior traction due to the strong adhesion of the vitreous cortex combines with the tangential traction brought on by a tightened internal limiting membrane (ILM). [2-4] Specifically, the formation of HMMHs, developing in around 8% of cases of MTM, relies on the breakdown of outer retinal layers and the creation of foveal cysts, caused by the coexistence on tangential and anteroposterior forces. [5, 6] Moreover, the persisting vitreous cortex traction, typical of highly myopic eyes, may lead to the development of macular hole retinal detachment (MHRD). [7-9]

The introduction of ILM inverted flap more than 10 years ago has significantly improved the closure rate of HMMHs, reaching around 90% even in cases complicated by MHRD. [10, 11] Nevertheless, more than 5% of myopic patients develop refractory or recurrent HMMH after first surgery.[12] In these cases, various surgical techniques have been proposed, including autologous transplantation of a free ILM flap, [13] autologous neurosensory retinal flap transplantation, [14] lens capsule transplantation [15] and, more recently, subretinal human amniotic membrane (hAM) patch. [16, 17]

Autologous ILM was successfully positioned over regions of choroidal atrophy and over posterior retinal tears originating from the staphyloma in extremely myopic RDs, [18] and a similar technique was reported for perifoveal macular holes (MHs). [19] However, as far as we know, an analysis of surgical outcomes of autologous ILM flap transplantation in the setting of refractory HMMHs still lacks. Consequently, the aim of this research was to assess long-term functional and anatomical outcomes of pars plana vitrectomy (PPV) and free ILM transplantation in highly myopic patients with refractory MHs who already underwent ILM peel. Moreover, we focused on side effects and drawbacks of this technique.

#### Materials and methods:

Retrospective interventional analysis of 13 eyes with refractory HMMH undergoing autologous ILM transplantation with gas tamponade. Best-corrected visual acuity (BCVA, Snellen), optical coherence tomography and fundus photography were scheduled at baseline and every follow-up visit (1, 3, 6, 12, 18, 24 months and the most recent). Preoperatively, we collected minimum linear diameter (MLD) and basal diameter (BD). Post-operatively, rates of external limiting membrane (ELM)/ellipsoid zone (EZ) restoration, excessive gliosis and subfoveal retinal pigmented epithelium (RPE) atrophy were evaluated.

#### Results:

Average AXL was  $31.45 \pm 2.07$  mm and mean follow-up was  $47.2 \pm 31.4$  months. Anatomical success was reached in 7/13 eyes (54%), while 2 cases showed persisting HMMH, 2 cases had early recurrence and 2 cases late recurrence. BCVA went from  $0.19 \pm 0.18$  to  $0.22 \pm 0.20$  at final follow-up ( $p=0.64$ ), improving in 5/13 eyes (38%). One eye showed continuous ELM and EZ lines, while another eye showed an irregular ELM but no EZ. Post-operatively, 5 eyes (71%) developed progressive atrophy of the subfoveal RPE, while excessive gliosis was reported in 3 eyes (43%). Furthermore, one patient developed post-operative chronic macular edema-like changes in the perifoveal area.

## Conclusions:

After a long term experience with HMMHs and after highlighting the shortfalls of autologous ILM flap transplantation, our group progressively abandoned this option in favor of newly proposed techniques, such as the use of hAM patches[36] and macular hydrodissection,[37] which demonstrated better anatomical and functional outcomes, even if reports with long-term follow-ups are not yet available in literature. A similar process occurred with the use of macular buckling, which had been our mainstay for the management of MTM,[38] but was then supplanted in our practice by less invasive techniques with lower rates of early and late complications.

In conclusion, autologous ILM transplantation with gas tamponade showed controversial results in recurrent HMMH, either in terms of anatomical and functional outcomes, with reconstitution of outer retinal layers being visible only in rare cases and a high risk of hole recurrence. Moreover, we highlighted the development of several post-operative complications, such as progressive subfoveal patchy atrophy and excessive gliosis, further limiting visual results.

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