Commentary: To evaluate the functional and anatomical outcomes for autologous retinal autograft with Finesse™ Flex Loop for failed macular holes

Pars plana vitrectomy (PPV) with internal limiting membrane (ILM) peeling and gas tamponade is widely accepted as the gold standard for the primary repair of full thickness macular holes (FTMHs) resulting in overall FTMH closure in 80–100% of cases.[1]

Manchester Large Macular Hole Study group (MLMHSG) noted that closure rate was lower in large macular holes. While large macular holes have been classified by Gass[2] as those with a minimum linear diameter of 400 μ or more, the MLMHSG proposed 650 m for the definition of "large FTMH" as a substantial decrease of the primary closure rate was documented in FTMH of these or larger diameters after PPV with conventional ILM peeling.[3] MLMHSG described excellent success rates for macular holes with size less than 600 μ with even the conventional ILM peeling techniques.[3]

Despite the high success rate, primary surgery can still fail to close the hole specially in large macular holes and a late reopening of the FTMH may also occur. The Manchester study concluded that unsuccessful FTMH closure may be related to FTMH having a duration > 6 months, ethnicity, high myopia, large basal diameter, inadequate ILM peeling or gas tamponade, inability of the patient to maintain postoperative posturing, traumatic etiology, hole configuration with flat edges, history of uveitis, and presence of concomitant macular disease such as drusen.[3-5]

For large macular holes, various techniques have been described starting with only vitrectomy, vitrectomy with ILM peeling,[1] inverted flap technique, and its modifications [use of adjuvants and grafts, large area of ILM peel, retinal massage, etc., with success rates from 70 to 100%].[3-5] We reported better visual outcomes with enlarged areas of ILM peeling using a video overlay guided technique.[6] However, a larger area of ILM peeling was seen to be associated with reduced sensitivity in the central macula.[7] Shukla and Kalliath.[8] observed that the macular holes were uniformly largest in the horizontal meridian and reported a consequent modification of ILM peeling based on the horizontally oval shape of macular holes. By extending the horizontal arc of ILM rhexis by another 1DD, they were able to close more than 90% of the macular holes averaging 700+ μm in diameter.

We have noted that in large FTMH (with basal diameter of 835 ± 208μ), closure could be achieved in all patients with our modified technique of retinal massage, performed after dye-assisted ILM peeling, using a 27G flute needle with a long and soft silicone tip under air in a centripetal direction around the FTMH followed by aspiration of residual fluid from the center of the hole using the same 27G soft-tipped cannula, and C3F8 gas tamponade. While vision improved in these eyes, the proportion of eyes with persistent ellipsoid zone defect reduced gradually from 80% at 1 month to 36% eyes at 12 months.[9]

Perhaps at this stage, it may be worthwhile mentioning that a FTMH is defined "refractory or persistent" when it remains open after the primary surgery and "recurrent" when a reopening is detected at least 4 weeks after initial successful closure.[10] Multiple surgical techniques can be used for the management of refractory/recurrent FTMHs.[11] In terms of both anatomical and functional outcomes, the surgical repair of a recurrent FTMH may have more favorable prognosis compared with the refractory FTMH.[12] In eyes with refractory and recurrent FTMHs, it is necessary to consider certain issues before planning a resurgery such as the original method or technique utilized, reduced amount or absence of ILM available for peeling, nonfeasibility of ILM inverted flap, and lower success rate of repeated surgeries. However, the potential of closure of the hole after a repeat surgery and thereby improved anatomical and functional outcomes appear to justify a second surgical procedure.[13] Revisional vitrectomy (rePPV) with ILM peeling enlargement can weaken the tangential tractions, cause increased retinal elasticity, and stimulate Müller cell activation. Intraocular tamponade may be able to induce FTMH closure.[14] While tamponade effect of the gas is higher, silicone oil and heavy silicone oil may be suitable for patients who are not able to maintain postoperative face-down posturing.[14]

For refractory macular hole cases, the technique of autologous ILM transplantation or ILM translocation,[8] where a free ILM graft is taken from peripheral retina and transplanted into the macular hole, has shown encouraging anatomical and visual outcomes.[15] Maeno *et al*.[16] had developed a new surgical instrument that can harvest and push a free autologous ILM flap safely and reliably into a refractory macular hole without causing collateral damage to the retinal pigment epithelium and the neural retina. Lens capsule and autologous blood have also been used to stuff recurrent/refractory macular holes with good results[17] Other techniques such as macular hole hydrodissection[18] and subretinal injection of BSS[17] were also proven to be of value in achieving improved anatomical and functional outcomes in refractory macular holes.

Grewal and Mahmoud first described the neurosensory retinal graft technique in closing a refractory MH.[19] It has been hypothesized that under pathological conditions, the Müller glia serve as a source of neuronal progenitor cells in the regenerating retina. The cells continue to divide and use the cell processes to migrate to the outer nuclear layer, thereby replacing lost photoreceptors. The transplanted retinal flap may represent a source of stem cells that can migrate into the native retina and promote the repair of the outer retinal layers.[20] However, the risk of graft dislocation with autologous retinal graft (ARG) both intraoperatively and postoperatively remains an issue. Wu *et al*.[21] combined ARG with autologous blood as a macular plug to increase stability and keep the graft in place. Shrinkage of graft has also been described. OCT angiography has also shown limited vascularization of the graft, multifocal electroretinogram showing reduced amplitude of N1 and P1 waveforms as compared to fellow eye.[22] However, today, there is significant amount of evidence of the effectiveness of ARG in refractory and recurrent FTMH.[10] Microscope-integrated optical coherence tomography (MIOCT) has recently been used in identifying graft size and fit within the MH. MIOCT can allow adequate sizing of the donor graft as well as tucking of the graft tissue with the real-time feedback from the OCT images.[23] The current article describes use of Finesse Flex loop for harvesting the graft, which may be a useful option.[24]

To conclude, the rationale of the surgical options most commonly adopted for secondary FTMH repair is mainly attributable to one of the various mechanisms that are presumed to induce the FTMH and also the personal experience of the operating surgeon.

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